BAX001 . . . . . GEE General

Ethylene oxide is a poisonous and explosive agent.
This manual therefore has to be thoroughly studied before the sterilizer is put into operation!

BAX002 . . . . . All manuals

Attention symbols

Some of the warnings, instructions and advice in this manual are so important that we used the following special symbols to draw attention to them:

Warnings

This symbol indicates a warning. Injury or even death may result if you do not heed it.
This symbol is also used to mark out safety components etc. See section ”Safety devices, a survey” in chapter ”Introduction” in the OPERATOR MANUAL or chapter ”Maintenance” in the SERVICE MANUAL

Instructions

This symbol indicates instructions which are important, for example to prevent damage to the sterilizer and/or the load

Advice

This symbol indicates important advice and hints that make it easier to work with the sterilizer.

INTRODUCTION

CAX016 . . . . . GEE General

Introduction GEE

The GETINGE sterilizer type GEE is intended for sterilization of heat sensitive goods which may be damaged by the temperature in a conventional steam sterilizer. The active sterilizing agent is ethylene oxide, used in a process at temperatures about 50 ^{o}C.

The sterilizing agent is stored in liquid state under pressure in gas bottles. The liquid ethylene oxide is transformed into gas in a heated evaporator before it enters the sterilizer chamber.

Both the sterilizer chamber and the door(s) are equipped with jackets in which temperature controlled water is circulated. This keeps chamber walls and door(s) at a uniform temperature, thereby preventing condensate from forming on the walls.

A computerized control unit, thoroughly described in a separate section of this manual, controls the process from start to end. The operator will not be able to alter any variables in the control unit program while a process is in progress.

Parameters such as jacket and chamber temperature as well as elapsed sterilizing time may be displayed by the operator at any time during the process.

CAX017 . . . . . GEE - Explosion proof

Owing to the general dangerousness of the sterilizing agent, some sterilizer main components are placed in separate rooms, differently classified with regard to the risk of explosion. The sterilizer pressure vessel with its executing components and the gas bottle storage room are classified as explosive area. Electric components in this area therefore are of the explosion proof type.

Electric temperature sensors are equipped with zener barriers while valve actuators and signal transmitters are of the pneumatic type in this zone. To enable for the pneumatic signals to be processed by the computer, they are converted outside the explosive area to electric signals.

Guidelines of using ethylene oxide as sterilant

Ethylene oxide properties

Ethylene oxide has its boiling point at 10,7 ^{o}C (51,3 ^{o}F) at atmospheric pressure and is at room temperature a colourless, flammable gas which is somewhat heavier than air.

Ethylene oxide is characterized by being readily reactive with many chemicals, soluble in most organic solutions as well as solid state organic materials and completely soluble in water at 10 ^{o}C (50 ^{o}F).

Polymerization of liquid state ethylene oxide is initiated at room temperature by acids, bases or such catalysts as dehydrated metal chlorides or -oxides. Rust may consequently serve as a polymerization starter. The polymerization is associated with a considerable heat production. Uncontrolled rise of the temperature may result in evaporation of ethylene oxide and ultimately risk of explosive decomposition. A temperature rise of a few degrees only may be indicative of risk of polymerization.

In contrast to the liquid state of ethylene oxide, which is relatively stable to detonating agents, gaseous ethylene oxide is highly explosive and flammable when mixed with air. Gaseous ethylene oxide in air is readily ignited by an electric spark, static electricity, an open flame or by similar means. If heated to 571 ^{o}C (1059,8 ^{o}F) in the absence of air or oxygen, ethylene oxide vapour will decompose with explosive violence. In an air mixture self ignition takes place at 429 ^{o}C (806 ^{o}F).

The health hazards when handling ethylene oxide are many.

- In gaseous state the agent affects the mucous membranes already below 100 ppm.
- The lower odour detection limit for ethylene oxide is as high as about 700 ppm and for this reason it can not serve as a risk-indicator for human exposition. Ethylene oxide has a fatiguing effect on the organs of smell even at low concentrations.
- For higher concentrations one feels sick with long periods of vomiting. The gas also works narcotically.
- At high gas concentrations the cornea of the eye may be injured as well as the mucous membranes of the throat and the pulmonary alveoli.
- After repeated contact there often appear an allergic hypersensitiveness.

- Severe inhalation poisoning causes, besides sickness and vomiting also mental aberration, weakness, cramp, difficulty in breathing, unconsciousness and occasionally pulmonary oedema.
- Ethylene oxide in liquid state is eating and causes blisters on the skin. The eating is not immediate but longer contact time causes deeper tissue decomposition.
- Liquid ethylene oxide is one of the most destructive agents to eyes.
- Ethylene oxide solved in water to 40-80% will cause more severe injuries than pure ethylene oxide. This circumstance has caused eat injuries on the human body on spots where ethylene oxide has dissolved in perspiration.
- Ethylene oxide is a readily reactive agent and an efficient solvent which must be taken into consideration when selecting material for articles and wrapping which are to be sterilized in this medium.
  - Carbon steel, stainless steel, glass, rubber, acrylic, polyamide, PVC, PTFE and polythene are not affected by ethylene oxide during the sterilization.
  - Rubber, leather, polythene, polymetylmetacrylate and PVC may absorb small quantities ethylene oxide which can be removed by exposing the goods to vacuum for some time.
  - Packing material like paper, wood, cotton, paint, ink and enamel is usually unaffected by the gas.

ETO- sterilization generally

The reason for the very rigorous directions for use and handling of ethylene oxide is that the substance, which from several points of view is very dangerous also in low concentrations, can be spread to the work area by accident, carelessness, unexpected malfunction of the equipment etc.

In the daily use of a gas sterilizer no gas escapes to the operato premises. The only occasion when very small quantities may be detected close to the sterilizer is when the sterilized goods is taken out from the chamber, because some of the material has absorbed a certain quantity of gas. No matter how small the amount might be, it must never be neglected.

Ethylene oxide is poisonous, explosive, cancerogenic and suspiciously mutating.

GETINGE AB has devoted great care in the design of the ethylene oxide sterilizer in order to obtain entire personal and material safety, not

only in the regular use of the sterilizer, but also in such extraordinary situations as can reasonably be predicted.

An indispensable condition in achieving the safety aimed at, is that the written advise regarding installation and operation of the sterilizer and accessory equipment is strictly followed and that its original technical performance is maintained by regular service as long as the sterilizer is in use.

There is concentrated ethylene oxide in:

THE GAS CYLINDER
The ethylene oxide is stored as a liquid under pressure in gas bottles or cylinders, each one containing a gas quantity sufficient for several sterilisation processes.

THE STERILIZER CHAMBER AND EVAPORATOR
The ethylene oxide is withdrawn from the cylinder not until a defined stage in the sterilization process is reached. The fluid ethylene oxide is converted into gas state in a heated evaporator before it enters the sterilizing chamber.

THE VACUUM PUMP AND THE EXHAUST SYSTEM
After the gas has influenced the goods for a stipulated time, it is pumped out of the sterilizer chamber by a water ring type vacuum pump. The gas is collected in a tank which also holds the recirculating sealing water for the pump. Gas and water are separated in the tank from which the gas is lead through an exhaust pipe to a destruction unit or into the open air. The exhaust pipe must, if led into the open air terminate minimum 3 m above ground level at a minimum distance of 7,5 m from human whereabouts, windows, air intakes etc.

There is ethylene oxide residuals in:

THE SEVICECOMPARTEMENT
During the humidification stage, steam is admitted to the chambe where it condensates. This increases the water content of the tank why the excess water is allowed to escape through an overflow with gas trap. This escaping water contains solved ethylene oxide which continuously evaporates. Close above the floor drain should therefore be arranged a ventilation hood, sized so as to be able to ventilate the whole service compartment with an air change of 10 times per hour. The air inle should be placed near the ceiling.

THE UNLOADING SIDE ROOM
In spite of the use of an efficient post-treatment process there remain unacceptable gas quantities in the sterilized goods. The goods has to be

degassed for a period of time which depends on the type of material in goods and wrapping as well as the ambient temperature. The air should, in this room, be changed 10 times per hour in diagonal direction from the ceiling towards the floor, so arranged that the air is moved away from the operator. With this arrangement, airing the goods for a longer period of time is allowed to take place in the same room as the unloading side of the sterilizer.

Ethylene oxide free is:

THE LOADING SIDE ROOM WITH DOUBLE ENDED STERILIZERS

Under regular operating conditions, there is no free ethylene oxide present in this room. There are however the same requirements on the ventilation here as on the unloading side, because if a process has to be aborted, access to the goods has to be gained from the loading side. (Only sterilized goods should be handled on the clean side).

Ventilation system

Exhaust from different rooms has to be made through a separate ventilation system. Alternatively the exhaust could be connected to an existing ventilation system, provided this does not work according to the recirculation principle.

Start of a sterilization process should be blocked as long as the ventilation system is not working.

Work-room

Any room opened for ethylene oxide sterilization should be used exclusively for this purpose and must not be used as a common working area or be utilized as a break-room for employees. Posted notice should allow authorized personnel only admission to the sterilizer room.

Warning posters

At the entrance or door to rooms where ethylene oxide is handled, a warning poster with information about the kind of room-activity should be posted. The sterilizer should be equipped with poster(s) informing about risk-, handling- and protective instructions according to local rules.

Gas storage

Not more gas than the every-day need should be stored in the room where the sterilizer is situated. For storing larger quantities of gas cylinders or bottles, take advice from the local fire authorities.

Requirement on the operator

The ethylene oxide sterilizer must be operated by specially educated personnel only. The education should besides the ”push button information” comprise:

- General information about ethylene oxide properties
- Knowledge about the sterilizer principle function
- Knowledge about the ventilation system
- Knowledge about the symptoms at the beginning of an ethylene oxide poisoning
- First aid to an ethylene oxide exposed person
- Measures in case of an ethylene oxide leak
- Knowledge about how to fight an ethylene oxide fire

Data for fire fighting

- Explosive mixture with air 2,6-100% of volume
- Ignition temperature 429 ^{o}C (806 ^{o}F)
- The gas is somewhat heavier than air

In case of accidents

- Do not use open flame
- Smoking is not allowed
- Use sparkless tools and explosion proof electric equipment

Leaks

- Make tight if possible
- Use atomizing water nozzle to damp formation of gas
- Drains should be covered and floors below the sterilizer floor evacuated

Fire

- Keep the gas bottles cool by spraying atomized cold water if they are in a fire
- Do not extinguish burning gas if it is not absolutely necessary
- Extinguish with atomized water or powder if absolutely necessary

First aid

- Rinse eyes in copious quantities of water for at least 15 min. if the agent has come in contact with the eyes

- Pull off contaminated clothes
- Wash contaminated skin with copious quantities of water
- Do not apply artificial respiration
- Call for a doctor when symptom arise which could result from contact with ethylene oxide in eyes or on skin

The sterilization gas

The sterilant is a mixture consisting of:

CAX042 . . . . . GEE General

Ethylene oxide as a sterilizing agent

Properties of ethylene oxide

Ethylene oxide boils at 10.7°C at atmospheric pressure and at room temperature is a colourless and combustible gas which is slightly heavier than air.

Ethylene oxide is characterised by reactivity with many chemicals, solubility in most organic solutions as well as in organic solids and complete solubility in water at 10°C.

The polymerisation of ethylene oxide in liquid form is initiated at room temperature by acids, bases or catalysts such as dehydrating metal chlorides or oxides. Rust can consequently give rise to polymerisation. The polymerisation is associated with significant heat production. A rise in temperature of just a few degrees may be a sign of a risk o polymerisation.

Unlike ethylene oxide in liquid form, which is relatively stable in relation to explosion initiators, gaseous ethylene oxide which is mixed with air is extremely explosive and combustible. Gaseous ethylene oxide is readily ignited by electric sparks, static electricity, naked flames etc. If ethylene oxide is heated to 571°C in the presence of air or oxygen, the ethylene oxide vapour disintegrates explosively. Spontaneous ignition occurs in an air mixture at 429°C.

The handling of ethylene oxide poses many health hazards.

- In gaseous form the substance already affects the mucous membranes at concentrations below 100 ppm.
- The lower odour limit for ethylene oxide is very high - 700 ppm - and therefore cannot be used as an indicator of exposure hazard. Ethylene oxide strains the olfactory organs even at low concentrations.

- People exposed to higher concentrations suffer from nausea and vomiting over long periods. The gas also has a narcotic effect.
- At high ethylene oxide concentrations the cornea of the eye, the mucous membranes of the throat and the alveoli of the lungs may be damaged.
- Allergic hypersensitivity often occurs after repeated contact.
- Severe poisoning through inhalation in addition to nausea and vomiting also causes mental confusion, a state of weakness, convulsions, respiratory difficulties, unconsciousness and in some cases pulmonary oedema.
- Ethylene oxide in liquid form is corrosive and causes blisters on the skin. The corrosive reaction does not occur immediately, but prolonged contact leads to disintegration of the deeper tissues.
- Ethylene oxide in liquid form is an extremely hazardous substance for the eyes.
- A 40 percent aqueous solution of ethylene oxide causes more severe damage than pure ethylene oxide. Corrosive damage has occurred in cases where ethylene oxide has been dissolved in sweat.
- Ethylene oxide is an extremely reactive substance and an effective solvent, which must be borne in mind when choosing the material of items and packaging sterilized in this medium.
  - Carbon steel, stainless steel, rubber, acrylic, polyamide, PVC, PTFE and polyethylene are not affected by ethylene oxide during sterilization.
  - Rubber, leather, polyethylene, polymethyl methacrylate and PVC may absorb small quantities of ethylene oxide, which can be removed by keeping the material under vacuum for a time.
  - Packaging materials such as paper, wood, cotton, paint, ink and enamel are generally not affected by the gas.

General information on ETO sterilization

The reason for the extremely strict instructions on the use and handling of ethylene oxide is that this substance, which is many ways is very hazardous even at low concentrations, may be spread within the workroom by accident, through carelessness, unexpected equipment faults and so on.

No discharges of gas in the operator room occur in the daily operation of a gas sterilizer. The only occasion when small quantities of gas may be detected close to the sterilizer is when the sterilized items are removed from the chamber, as the material may have absorbed a certain

amount of gas. Regardless of how small the quantities involved are, they must never be ignored.

Ethylene oxide is toxic, explosive, carcinogenic and suspected of causing mutations.

GETINGE AB has put great emphasis on personal and material safety in designing the ethylene oxide sterilizer, not just with routine operation in mind but also to deal with exceptional situations that can be reasonably predicted.

It is an essential requirement, for the intended level of safety to be achieved, that the written instructions for installation and operation of the sterilizer and additional equipment are strictly complied with and that technical performance is maintained by regular servicing during the time the sterilizer is in use.

There is concentrated ethylene oxide in:

THE GAS CONTAINER

Ethylene oxide is stored in the form of liquid under pressure is gas bottles or cylinders, which contain a quantity of gas sufficient for several sterilization processes.

THE STERILIZATION CHAMBER AND THE EVAPORATOR WITH ASSOCIATED PIPE SYSTEM

Ethylene oxide is not taken from the cylinder until the sterilization process has reached a particular point. Liquid ethylene oxide is gasified in a heated evaporator and is then conveyed into the sterilization chamber.

THE VACUUM PUMP AND THE OUTLET SYSTEM

After the gas has acted on the items for the specified time, the gas is pumped out of the sterilization chamber by a vacuum pump of the water-ring type. The gas is collected in a tank which also contains the circulating sealing water for the pump. Gas and water are separated in the tank and the gas is conveyed through an outlet pipe to the cleaning unit or outside the building. The mouth of an outlet pipe discharging into the atmosphere must be at least 3 m above ground level and at least 7.5 m from areas where people spend time or where there are windows, air intakes and so on.

There are ethylene oxide residues in:

THE SERVICING ROOM

During the moistening phase vapour is released into the chamber. The vapour condenses on the load until the load has reached the correct tem-

perature. This increases the liquid level in the gas separator tank. This liquid contains ethylene glycol and dissolved ethylene oxide which continuously evaporates. Liquid is drained off from the tank when the liquid level becomes too high. The tank is emptied through the valve in the bottom.
This liquid must be disposed of in accordance with local safety regulations.

Because of the potential risk of leaks, the whole servicing room must be ventilated, with the air changed at least 10 times an hour. The extraction point must normally be located at the floor drain and the air intake close to the ceiling.

THE UNLOADING ROOM
Despite an effective post-treatment process, unacceptable quantities of gas remain in the sterilized items. The items therefore have to degassed during a time which depends on the type of item and packaging concerned and the ambient temperature. The complete quantity of air in the room should be changed 10 times an hour in a diagonal direction from the ceiling to the floor so that the air moves in the direction away from the operator. With this arrangement it is permissible to air the items for a longer time in the room serving as the discharge side for the sterilizer.

There is no ethylene oxide in:

THE CHARGING ROOM (STERILIZER WITH TWO DOORS)
Under normal operating conditions there is no free ethylene oxide in this room. The ventilation requirements are nevertheless the same as on the discharge side, as the items have to be handled from the charging side if the process stops. (Only sterilized items may be handled on the clean side.)

Ventilation system

The discharge from different rooms must be conveyed via separate ventilation systems. The discharge can alternatively be connected to an existing ventilation system, provided this operates according to the recirculation principle.

The start of the process must be blocked for the time the ventilation system is not working.

Workrooms

The rooms used in connection with the ethylene oxide sterilization must be dedicated to this purpose, and must not be used as general workrooms or rest rooms for the personnel. A notice stating that only authorized personnel have access to the sterilizer room must be posted up.

Warning notice

A warning notice must be posed up at the entrance or on the doors to the rooms where ethylene oxide is handled, containing information on the type of activity taking place in the rooms. The sterilizer should be provided within one or more notices containing hazard, handling and protection instructions in accordance with local regulations.

Gas storage

No more gas than is required to meet the daily requirement may be kept in the sterilizer room. Local fire safety authorities must be consulted on the storage of larger quantities of gas cylinders or bottles.

Requirements to be met by the operator

Only specially trained personnel may handle the ethylene oxide sterilizer. The training must go further than "press the button" information and cover the following:

- general information on the properties of ethylene oxide
- knowledge on the basic function of the sterilizer
- knowledge on the ventilation system
- knowledge on the symptoms of incipient ethylene oxide poisoning
- first aid for persons exposed to ethylene oxide
- action to be taken in the event of an ethylene oxide leak
- knowledge on how to control an ethylene oxide fire

Firefighting information

- Explosive mixture with 2.6-100% air
- Ignition temperature 429°C
- The gas is slightly heavier than air.

If an accident happens

- Do not use a naked flame
- Smoking is prohibited
- Use non-sparking tools and explosion-proof electrical equipment

Leaks

- Seal the leak if possible

- Stop the formation of gas using water through a nozzle
- Cover the outlets and evacuate the storeys of the building below the floor of the sterilizer room

Fire

- If the gas bottles are exposed, cool them by spraying cold water
- Do not extinguish burning gas unless absolutely necessary
- If it is necessary to extinguish, use sprayed water or powder.

First aid

- If the agent has entered the eyes, rinse with very copious amounts of water for at least 15 minutes
- Take off clothes contaminated with gas
- Wash exposed skin with very copious amounts of water
- Go not give artificial respiration
- Contact a doctor if symptoms occur which may be due to ethylene oxide having come into contact with the eyes or skin

Sterilization gas

The sterilizing medium is a mixture of:

CAX019. . . . . 10/90 ETO/CO2

10% ethylene oxide C_2H_4O
90% carbon dioxide CO_2

The gas mixture is stored as a liquid in gas bottles with a pressure about 51 bar (740 psig) at room temperature. The gas has to be taken out as a liquid which usually is done via a dip pipe from the bottom of the bottle. This arrangement calls for an upright position of the bottle while withdrawing the gas.

Consult your gas supplier regarding how to place the bottle to ensure that only the liquid stage is withdrawn from the bottle.

CAX023. . . . . 20/80 ETO/CO2

20% ethylene oxide C_2H_4O
80% carbon dioxide CO_2

The gas mixture is stored as a liquid in gas bottles with a pressure about 49 bar (700 psig) at room temperature. The gas has to be taken out as a liquid which usually is done via a dip pipe from the bottom of the

bottle. This arrangement calls for an upright position of the bottle while withdrawing the gas.

Consult your gas supplier regarding how to place the bottle to ensure that only the liquid stage is withdrawn from the bottle.

CAX025 . . . . . 30/70 ETO/CO2

30% ethylene oxide C_2H_4O
70% carbon dioxide CO_2

The gas mixture is stored as a liquid in gas bottles with a pressure about 40 bar (600 psig) at room temperature. The gas has to be taken out as a liquid which usually is done via a dip pipe from the bottom of the bottle. This arrangement calls for an upright position of the bottle while withdrawing the gas.

Consult your gas supplier regarding how to place the bottle to ensure that only the liquid stage is withdrawn from the bottle.

CAX027 . . . . . 90/10 ETO/CO2

90% ethylene oxide C_2H_4O
10% carbon dioxide CO_2

The gas mixture is stored as a liquid in gas bottles with a pressure about 7 bar (100 psig) at room temperature. The gas has to be taken out as a liquid which usually is done via a dip pipe from the bottom of the bottle. This arrangement calls for an upright position of the bottle while withdrawing the gas.

Consult your gas supplier regarding how to place the bottle to ensure that only the liquid stage is withdrawn from the bottle.

CAX029 . . . . . 10/90 ETO/Freon

10% ethylene oxide C_2H_4O
90% dichlorodifluoromethane CCl_2F_2

The gas mixture is stored as a liquid in gas bottles with a pressure about 4 bar (60 psig) at room temperature. The gas has to be taken out as a liquid which usually is done via a dip pipe from the bottom of the

bottle. This arrangement calls for an upright position of the bottle while withdrawing the gas.

Consult your gas supplier regarding how to place the bottle to ensure that only the liquid stage is withdrawn from the bottle.

CAX031. . . . . 12/88 ETO/Freon

12% ethylene oxide C_2H_4O
88% dichlorodifluoromethane CCl_2F_2

The gas mixture is stored as a liquid in gas bottles with a pressure about 3,5 bar (51 psig) at room temperature. The gas has to be taken out as a liquid which usually is done via a dip pipe from the bottom of the bottle. This arrangement calls for an upright position of the bottle while withdrawing the gas.

Consult your gas supplier regarding how to place the bottle to ensure that only the liquid stage is withdrawn from the bottle.

CAX020. . . . . GEE general

It is important that the sterilant is withdrawn as liquid from the containers and that the liquid is completely vaporised prior to introduction of the vapour into the sterilizing chamber. The mixture fed into the sterilizing chamber will then have the specified ethylene oxide content and the dangers associated with flammable vapours will be reduced.

CAX021. . . . . 10/90 ETO/CO2

If, on the other hand, vapour is withdrawn from the container top, fractioning of the two components of the mixture will take place and initially the vapour will contain more carbon dioxide than the liquid, since CO_2 being the more volatile component. Such vapour will have reduced sterilizing properties since the proportion of ethylene oxide will be reduced. As evaporation of the liquid progresses the remaining liquid will be enriched with ethylene oxide and ultimately the vapour off-take from the container will have an ethylene oxide content in excess of 10% and hence will be more flammable.

CAX024. . . . . 20/80 ETO/CO2

If, on the other hand, vapour is withdrawn from the container top, fractioning of the two components of the mixture will take place and initially the vapour will contain more carbon dioxide than the liquid, since CO_2 being the more volatile component. Such vapour will have reduced sterilizing properties since the proportion of ethylene oxide will be reduced. As evaporation of the liquid progresses the remaining liquid

will be enriched with ethylene oxide and ultimately the vapour off-take from the container will have an ethylene oxide content in excess of 20% and hence will be more flammable.

CAX026 . . . . . 30/70 ETO/CO2

If, on the other hand, vapour is withdrawn from the container top, fractioning of the two components of the mixture will take place and initially the vapour will contain more carbon dioxide than the liquid, carbon dioxide being the more volatile component. This vapour will have reduced sterilizing properties since the proportion of ethylene oxide will be reduced. As evaporation of the liquid progresses the remaining liquid will be enriched with ethylene oxide and ultimately the vapour off-take from the container will have an ethylene oxide content in excess of 30% and hence will be more flammable.

CAX028 . . . . . 90/10 ETO/CO2

If, on the other hand, vapour is withdrawn from the container top, fractioning of the two components of the mixture will take place and initially the vapour will contain more carbon dioxide than the liquid, carbon dioxide being the more volatile component. This vapour will have reduced sterilizing properties since the proportion of ethylene oxide will be reduced. As evaporation of the liquid progresses the remaining liquid will be enriched with ethylene oxide and ultimately the vapour off-take from the container will have an ethylene oxide content in excess of 90%.

CAX030 . . . . . 10/90 ETO/Freon

If, on the other hand, vapour is withdrawn from the container top, fractioning of the two components of the mixture will take place and initially the vapour will contain more dichlorodifluoromethane than the liquid, since CCl_2F_2 being the more volatile component. Such vapour will have reduced sterilizing properties since the proportion of ethylene oxide will be reduced. As evaporation of the liquid progresses the remaining liquid will be enriched with ethylene oxide and ultimately the vapour off-take from the container will have an ethylene oxide content in excess of 10% and hence will be more flammable.

CAX032 . . . . . 12/88 ETO/Freon

If, on the other hand, vapour is withdrawn from the container top, fractioning of the two components of the mixture will take place and initially the vapour will contain more dichlorodifluoromethane than the liquid, since CCl_2F_2 being the more volatile component. Such vapour will have reduced sterilizing properties since the proportion of ethylene oxide will be reduced. As evaporation of the liquid progresses the remaining liquid will be enriched with ethylene oxide and ultimately the vapour off-take from the container will have an ethylene oxide content in excess of 12% and hence will be more flammable.

CAX022. . . . . GEE general

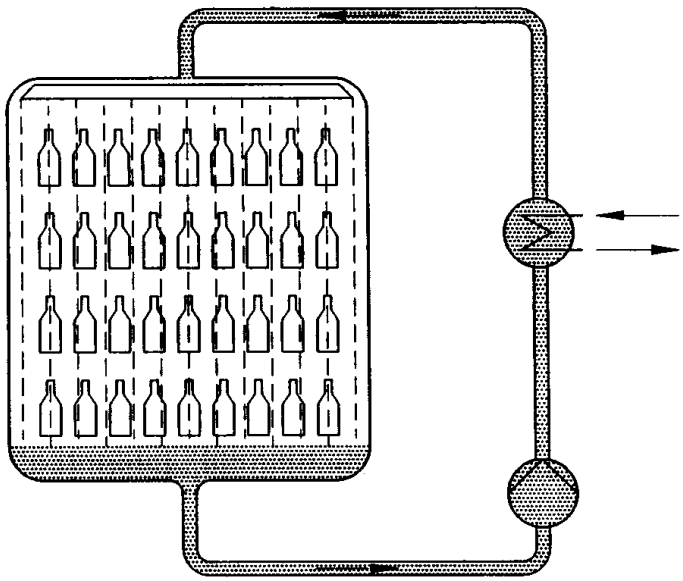
The pressure within a container gives an inaccurate information about the quantity of liquefied gas held by the container. The only satisfactory way of checking the contents of cylinders and drums is by weighing, and this method should be used to determine whether a container is empty. A simple means to get continuous information about the gas content of the bottle is to keep it standing on a scale while withdrawing the gas.

The gas bottle storage room has to be well ventilated with change of air at least ten times per hour in the direction from ceiling towards floor.

CAX002. . . . . GEC general

Introduction GEC

Sterilizer type GEC is the collective designation of a range of GETINGE high pressure sterilizers using circulating process water as heat transfer media. GEC-sterilizers are available with vertically or horizontally sliding automatic doors. Both single and double ended types exist.



The GEC-sterilizers are intended for sterilization of liquids contained in pressure tight glass or plastic containers which resist pouring with water. If the sterilizer is equipped with a vacuumpump it may also serve as an ordinary steam sterilizer suitable for sterilization of utensils, containers, textiles etc.

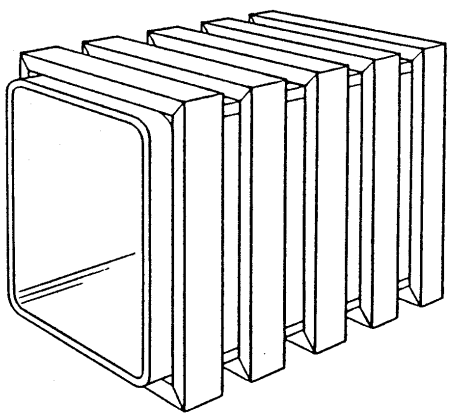
Adaptation to respectively task is made mainly by selecting type of software for the control unit. The sterilizer control unit is computerized and provides possibilities for a large number of processes, all characterized by a very good accuracy in controlling the process parameters.

Both instantaneous and set values for a proceeding process may be displayed on request.

The software which controls the processes can be fixed programmed in the control unit to combine quickness with safety in the production lines. When it comes to odd type of works, most process parameters can be set from time to time by the operator.
Reprogramming of the control unit can be made at site.

The automatic doors are provided with safety devices to protect the operator.

The sterilizer chamber, made of acid proof stainless steel is covered externally to about half its area by seal-welded u-profiles which serve both as stiffening bars for the pressure vessel and, for vacuum-cycles, as a steam jacket containing temperature controlled steam heating for the chamber walls.



The GEC-type sterilizers should be supplied with electricity, cold water, process water, compressed air and steam. If central steam is not available or there are reasons not to use it, small GEC-units can be equipped with an electric steam generator.

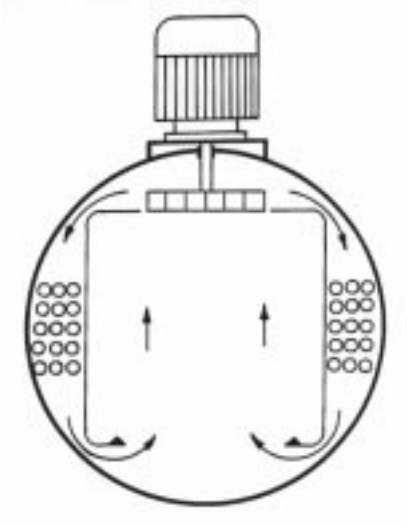
Introduction GEV

The GEV sterilizer is characterized by one or more ventilators, arranged at the sterilizer chamber ceiling, to keep the chamber atmosphere in violent circulation.

The utilized compartment is made of comparatively thin stainles steel sheet and is centrically located in a surrounding pressure vessel. The space between the utilized compartment and the pressure vessel is filled at each sides with a pack of tubes which are flown through by cold water, or in some cases by steam.

The ventilators make the chamber atmosphere pass through the pipe pack in direction from the ceiling towards the floor, thereby being cooled or heated depending on the medium passing through the pipes.

The flow through the load will consequently go in the direction from below and upwards.



The special feature of the ventilator sterilizer renders it unique properties. Besides the sterilizer functioning as a common steam sterilizer, it also works excellent with support pressure, created through the admission of compressed air into the chamber. The turbulent flow caused by the ventilators will efficiently homogenize the chamber atmosphere so as to create a uniform temperature all over the chamber. Without the ventilator stirring effect a stratification between steam and air would easily take place with big temperature gradients as a consequence.

Sterilizing products being sensitive to moisture can be treated in ventilator sterilizers which are heated by steam passing through the packs of pipe. The heat produced is transferred to the goods when the ventilator circulates the air trapped in the chamber. The process can be complemented with support pressure created by compressed air.

The principle described in the paragraph above is also used as a drying procedure, for instance if an extremely dry load is required after a steam sterilization.

By letting cold water through the pipe-pack an efficient cooling of the load will be obtained. Also the cooling process can be complemented with support pressure created by compressed air.

Introduction GEVC

Sterilizer type GEVC is the collective designation of a range of GETINGE high pressure sterilizers capable of using either circulating process water or circulating air as heat transfer media. GEVC-sterilizers are available with vertically or horizontally sliding automatic doors. Both single and double ended types exist.

The GEVC-sterilizers are designed for sterilization of most types of products. The sterilizer can run both GEC-cycles and GEV-cycles.

GEC-cycles are often intended for sterilization of liquids contained in pressure tight glass or plastic containers which resist pouring with water. In this case circulating water is used as heat transfer media. A centrifugal pump is used for circulating the water.

GEV-cycles are used when there is a demand for a package for the product. Also this type of cycles can be used for sterilization of liquids in sealed containers. For GEV-cycles air and steam are used as heat transfer media. One, or several, fans are used to keep the chambe atmosphere in violent circulation.

If the sterilizer is equipped with a vacuumpump it may also serve as an ordinary steam sterilizer suitable for sterilization of utensils, containers, textiles etc.

Adaptation to respectively task is made mainly by selecting type of software for the control unit. The sterilizer control unit is computerized and provides possibilities for a large number of processes, all characterized by a very good accuracy in controlling the process parameters. Both instantaneous and set values for a proceeding process may be displayed on request.

The software which controls the processes can be fixed programmed in the control unit to combine quickness with safety in the production lines. When it comes to odd type of works, most process parameters can be set from time to time by the operator.

Reprogramming of the control unit can be made at site.

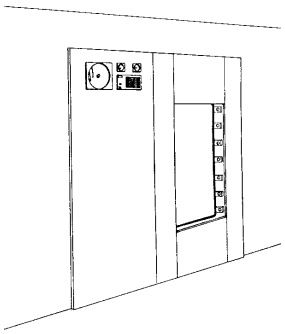
The automatic doors are provided with safety devices to protect the operator.

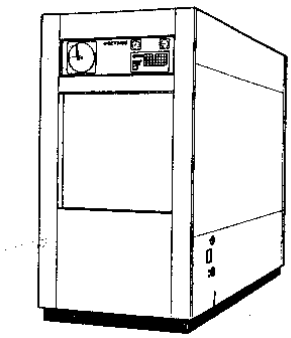
The GEVC-type sterilizers should be supplied with electricity, cold water, process water, compressed air and steam. If central steam is not available or there are reasons not to use it, small GEVC-units can be equipped with an electric steam generator.

Introduction GE

Sterilizer type GE is the collective designation of a range of GETINGE high pressure sterilizers using steam and vacuum in the process for ster-

ilization. GE-sterilizers are available with vertically or horizontally sliding doors. Both single and double ended types exist.





The GE-sterilizers are intended for sterilization of materials in the health service as well as in the pharmaceutical industry. The type o materials include: instruments, utensils, glass, plastic, leather and textiles. Some sterilizers have special programs for sterilization of hot and cold liquids. The all dominating sterilizing agent is steam with a temperature of 120-135 °C.

Adaptation to respectively task is made mainly by selecting type of software for the control unit. The sterilizer control unit is computerized and provides possibilities for a large number of processes, all characterized by a very good accuracy in controlling the process parameters. Both instantaneous and set values for a proceeding process may be displayed on request.

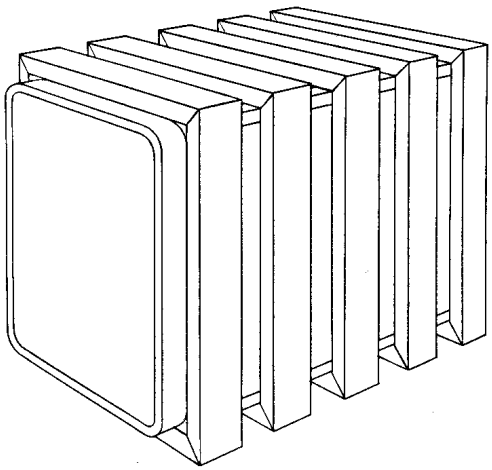
The software which controls the processes can be fixed programmed in the control unit to combine quickness with safety in the production lines. When it comes to odd type of works, most process parameters can be set from time to time by the operator.

Reprogramming of the control unit can be made at site.

The automatic doors are provided with safety devices to protect the operator.

The sterilizer chamber, made of acid proof stainless steel is covered externally to about half its area by seal-welded u-profiles which serve

both as stiffening bars for the pressure vessel and as a steam jacket containing temperature controlled steam heating for the chamber walls.

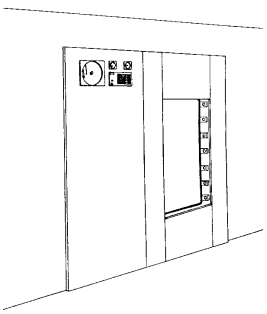


The GE-type sterilizers should be supplied with electricity, cold water, compressed air and steam. If central steam is not available or there are reasons not to use it, GE-units can be equipped with an electric steam generator.

CAH017 . . . . . Introduction to GE sideways-opening, Hospital

Autoclave type GE

Getinge Autoclave type GE is the designation of a series of high-pressure autoclaves with horizontal, automatic sliding doors in single-door and double-door versions..



The autoclaves are intended for the sterilization of equipment both in hospitals and industry. Adaptation to the particular functions concerned is done through the selection of control equipment. This is based on a microprocessor and consequently offers a very large number of types of process, all characterized by exceptional accuracy in the regulation of the process parameters. The operator can call up on a display information on the current process, current process phase and the actual values of the parameters while the process is in progress.

The totally dominant sterilization medium is steam with a temperature of 121 - 134 °C. Material which is damaged by this temperature may be sterilized, in certain autoclave models, in formalin vapour at 65 - 80 °C.

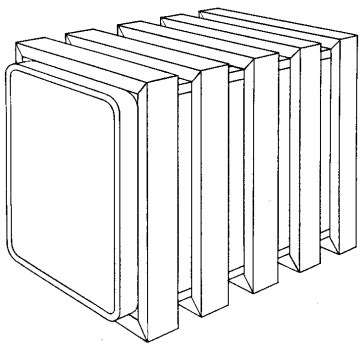
Most types of items can be sterilized in the GE autoclaves, using adapted programs:
Instruments, machine parts, glass, plastic, rubber, leather, textiles, cold and hot liquids in open or ventilated containers and small pressure-tight liquid-filled containers of stable shape.

European standard EN 285 specifies the use of fixed programs only. However, the control equipment of GE autoclaves allows the programs to be made variable during the time testing is in progress.

If the autoclave is not covered by European standard EN 285, all the programs are variable.

As door operation is controlled automatically as well as the processes, it is not a long step to automation of the handling of items for sterilization. The control unit is therefore prepared for the control of autoclaves with automatic loader and/or unloader.

As in other Getinge double-jacketed autoclaves, the external surface of the chamber is half-covered with all-welded U-sections. These stiffen the flat walls of the pressure vessel, and at the same time accommodate the steam which keeps the chamber walls warm in order to minimize condensation in the chamber. The design principle means that all welds are available for visual inspection after the thermal insulation has been removed.



A vacuum pump of the water-ring type removes air, steam and condensate from the chamber and door-gasket groove. The sealing water of the pump is taken from an open pump which in some cases also supplies the feed-water pump with water on autoclaves with a built-in steam generator.

The condenser between the chamber and the vacuum pump converts waste steam to water. The decrease in volume contributes substantially to increasing the efficiency of pump operation and protecting the pump and discharge lines against high temperatures.

A well-damped discharge system after the vacuum pump and well-dimensioned thermal insulation around the chamber mean that the auto-

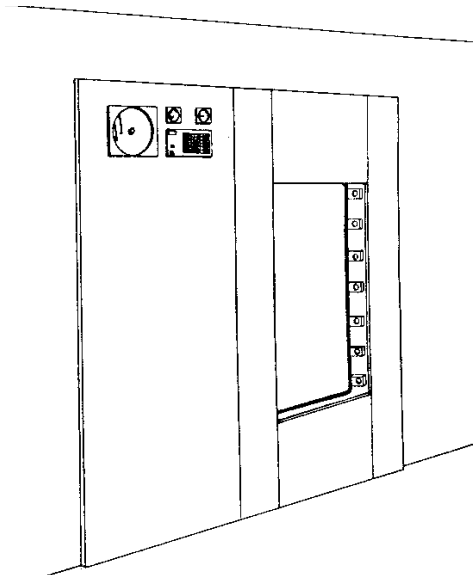
clave has a minimal effect on the surroundings where it is installed, making it easy to position.

GE autoclaves have to be supplied with electricity, cold water, compressed air and steam. When steam is supplied from a central steam-production plant, its distribution is required to be well insulated and dewatered. The pressure in the line has to be reduced to the correct level and the line has to be fitted with a safety valve. In addition, the steam plant must produce a quality of steam which is suitable in the context of sterilization.

If there is no steam network or there are reasons for not using the steam network, the autoclave can be fitted with a built-in electric steam generator (certain models only) or a stand-alone steam generator which is installed in the service room.

Introduction GED

Sterilizer type GED is the collective designation of a range of GETINGE high pressure disinfection autoclaves using steam and vacuum in the process for disinfection.



The GED operate at the temperature 105 ^{o}C, or for heat sensitive goods at 75 ^{o}C. In both cases steam serves as a disinfection agent, in the latter case under vacuum. Very heat sensitive material can be disinfected in specially designed GED´s by means of formaldehyde at 65 ^{o}C.

Since the process include vacuum stages, the control unit is equipped with a process for automatic leak rate test.

Jacket temperatures below 100 ^{o}C are enabled by using subatmospheric steam, produced by intermittent evacuation of the jacket.

The processes are based upon the GETINGE principle with pulsating prevacuum, known for its air purging abilities.

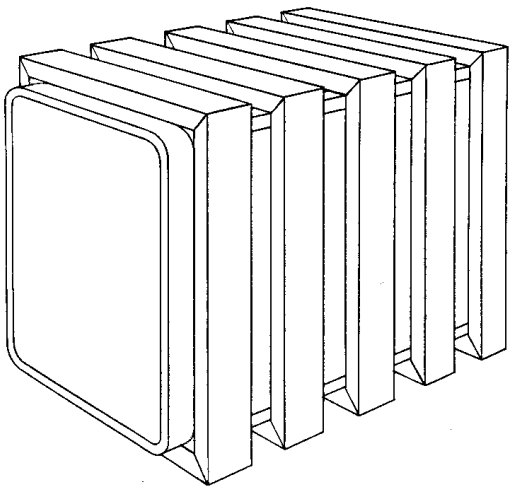
Adaptation to respectively task is made mainly by selecting type of software for the control unit. The sterilizer control unit is computerized and provides possibilities for a large number of processes, all characterized by a very good accuracy in controlling the process parameters. Both instantaneous and set values for a proceeding process may be displayed on request.

The software which controls the processes can be fixed programmed in the control unit to combine quickness with safety in the production lines. When it comes to odd type of works, most process parameters can be set from time to time by the operator.

Reprogramming of the control unit can be made at site.

The automatic doors are provided with safety devices to protect the operator.

The sterilizer chamber, made of acid proof stainless steel is covered externally to about half its area by seal-welded u-profiles which serve both as stiffening bars for the pressure vessel and as a steam jacket containing temperature controlled steam heating for the chamber walls.



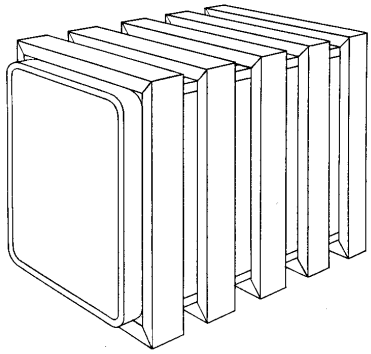
The GED-type sterilizers should be supplied with electricity, cold water, compressed air and steam. If central steam is not available o there are reasons not to use it, GED-units can be equipped with an electric steam generator.

CAX033. . . . . GEE general

The sterilizer

The sterilizer chamber, made of acid proof stainless steel is covered externally to about half its area by seal-welded u-profiles which serve both as stiffening bars for the pressure vessel, and as a double jacket

containing the medium heating the chamber walls. The design principle makes all weld seams accessible for visual inspection after removal of the heat insulation.



The gas sterilant is drawn as a liquid from bottles or cylinder containers. It is converted into a gas in a heated evaporator which is designed to serve also as a cleaner for the gas.

Steam required for the processes should be taken from a well drained steam supply line, or when not available from a steam generator.

The vacuum pump of water ring type takes its sealing water from a vented tank to which it also delivers the used water. The gas leaving the pump escapes through a exhaust pipe, connected to the water tank.

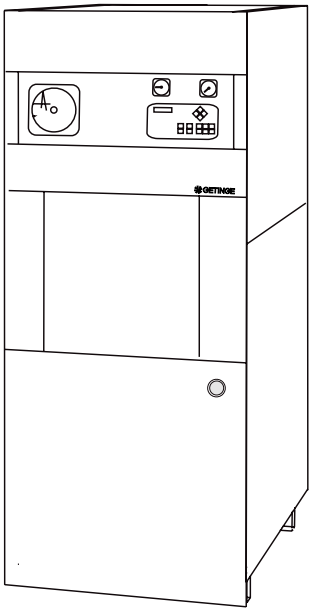
With double ended sterilizers the doors are interlocked, enabling for one door only to be opened at a time. After an error has occurred or whenever manual interference has taken place in the process, the unloading door remains closed and the loading door will be the only one giving access to the chamber.

The sterilizer should be supplied with electricity, cold water, compressed air (or nitrogen when explosion proof) and steam. When the latter is taken from a central production plant, it is essential that the distribution piping is properly drained. If central steam is not available or there are reasons not to use it, an electric steam generator may be supplied.

GE 2044

Sterilizer type GE 2044 is the collective denomination for a range of GETINGE high pressure sterilizers with vertically sliding manual doors, all with the door opening 430 x 430 millimetre

Both single and double ended types exist.



The sterilizers are intended for sterilization of materials in the health service as well as in the industry. Adaptation to respectively task is made mainly by selecting type of control unit. This is built up around a micro processor and therefore provides an almost endless number of processes, all characterized by a very good accuracy in controlling the process parameters. Both instantaneous and set values for a proceeding process may be displayed on request.

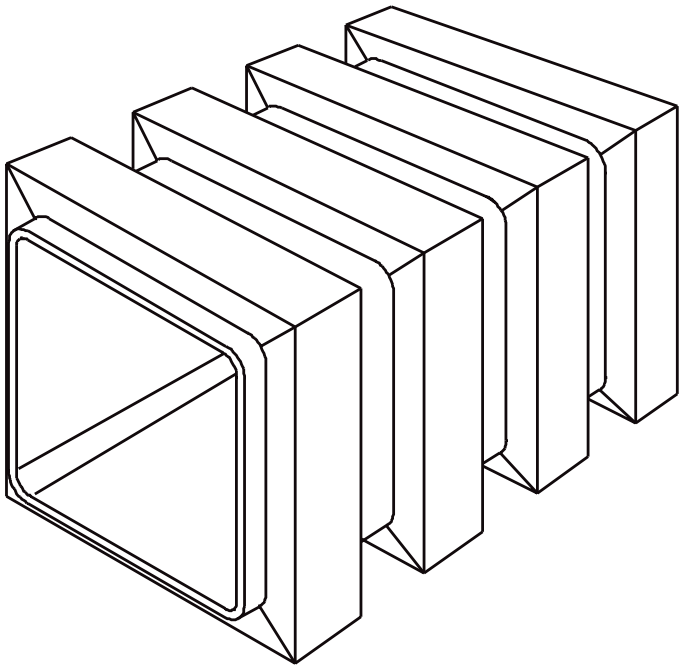
The all dominating sterilizing agent is steam with a temperature of 120 - 135 °C. Material which may be damaged at this temperature can, in some sterilizer models, be sterilized in formaldehyde vapour at 60 - 80 °C.

The 2044-sterilizers are intended for processing a great variety o goods such as: instruments, utensils, glass, plastic, leather, textiles, hot or cold liquids in open or vented containers and small rigid pressure tight liquid ampoules. This is done with dedicated programmes.

European Standard EN 285 prescribes the use of fixed programs only. The control equipment of the 2044 sterilizers allows the programs to be varied during testing.

The sterilizer chamber, made of acid proof stainless steel is covered externally to about half its area by seal-welded U-profiles which serve

both as stiffening bars for the pressure vessel, and as a steam jacket containing temperature controlled steam heating the chamber walls.



A vacuumpump of the water ring type removes air, steam and condensate from the chamber. Its sealing water is taken from an open tank which also serves the feed water pump on sterilizers equipped with a built in steam generator.

The condenser between chamber and vacuum pump converts all waste steam to water. This reduction of the pump handling volume speeds up the vacuum producing process and will save the pump and waste piping from high temperatures.

A well silenced drain system after the vacuum pump and the well sized thermal chamber insulation makes the sterilizer an environmentally pleasing unit, easy to locate.

The type 2044 sterilizers should be supplied with electricity, cold water, steam and, for LAB- and formaldehyde sterilizers, also compressed air. When steam is taken from a central production plant, it is essential that the distribution piping is properly drained.

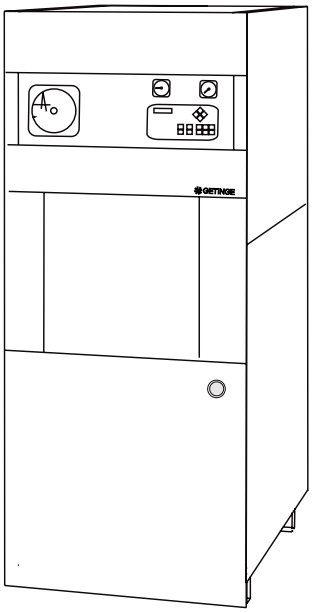
If central steam is not available or there are reasons not to use it, an electric steam generator, contained within the cabinet volume may be supplied.

GEF-449 perFORMer

GEF-449 perFORMer is the designation of a series of GETINGE high-pressure sterilizers with a vertical manual sliding door, all of which

have a charging opening of 430 x 430 mm and a chamber depth of 940 mm.

There are both stand-alone and built-in versions.



The sterilizers are intended for the sterilization of items in hospitals. They are adapted to the items concerned through the choice of control equipment. This control equipment is based on a microprocessor and consequently offers a number of types of process, all of which are characterized by exceptional accuracy in the regulation of process parameters. The operator can call up information on the current process, current process phase and the actual values of parameters on a display while the process is in progress.

There are two variants of sterilizers, one for a combination of steam and formalin sterilization and the other for formalin alone.

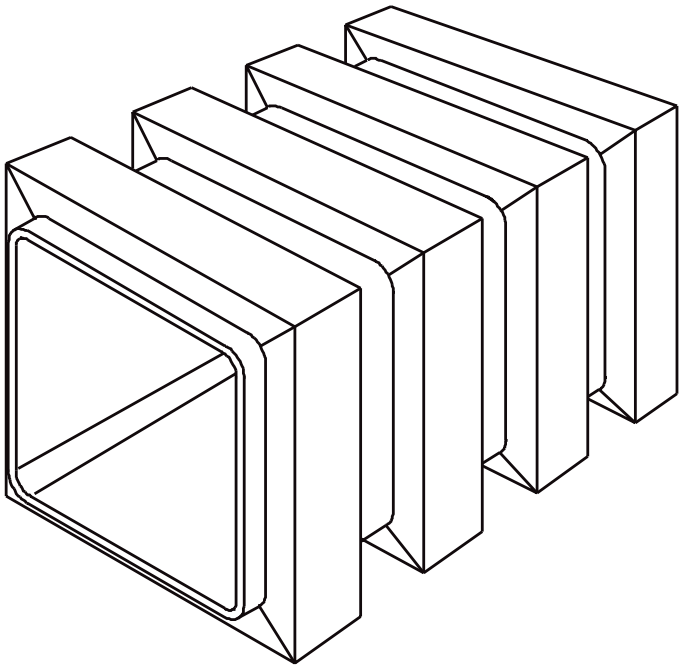
The sterilizing medium of the combined sterilizer is principally steam at a temperature of 121 - 134°C. Materials which are damaged by this temperature are sterilized in formalin vapour at 50 - 80°C.

Most types of items can be treated in the GEF-449 sterilizers, using adapted programs:
Instruments, machine parts, glass, plastics, rubber, leather, textiles and temperature-sensitive materials.

European Standard EN 285 for steam sterilizers specifies the use of fixed programs only in steam sterilization. However, the control equipment of the GEF-449 sterilizers allows the programs to be made variable during the time testing is in progress.

As with Getinge's other double-jacketed sterilizers, the external surface of the chamber and doors is half-covered with all-welded U sections. These stiffen the flat walls of the pressure vessel, as well as holding the steam that keeps the chamber walls and doors warm to minimize condensation in the chamber. (The doors are only heated in the

case of formalin sterilization.) The principle of design means that all the welds are accessible for visual inspection after the thermal insulation has been removed.



A vacuum pump of the water-ring type removes air, steam and condensation from the chamber and door-seal groove. The pump's sealing water is taken from an open tank which also supplies the feed-water pump on sterilizers equipped with steam generators with water.

The condenser between the chamber and vacuum pump converts waste steam to water. The decrease in volume contributes greatly to making pump operation more efficient and protecting the pump and discharge lines against high temperatures.

A well-damped discharge system after the vacuum pump and well-dimensioned thermal insulation around the chamber mean that the sterilizer affects the surroundings of the place where it is installed to an insignificant extent and is therefore a unit that is easy to locate.

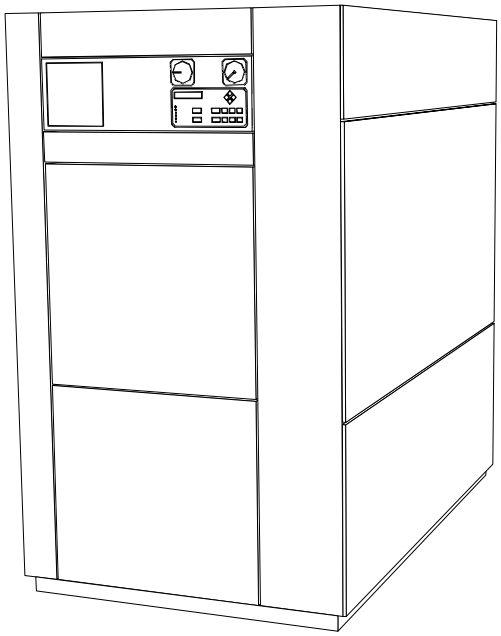
GEF-449 sterilizers have to be supplied with electricity, cold water, steam and compressed air. When steam is supplied from a central steam production facility, its distribution system is required to be well dewatered.

If there is no steam network or there are reasons for not using the steam network, an electric steam generator may be installed inside the lining plates on all models.

GE 2066

Sterilizer type GE 2066 is the collective denomination for a range of GETINGE high pressure sterilizers with vertically sliding automatic doors, all with the door opening 660 x 660 mm

Both single and double ended types exist.



The sterilizers are intended for sterilization of materials in the health service as well as in the industry. Adaptation to respectively task is made mainly by selecting type of control unit. This is built up around a micro processor and therefore provides an almost endless number of processes, all characterized by a very good accuracy in controlling the process parameters. Both instantaneous and set values for a proceeding process may be displayed on request.

The all dominating sterilizing agent is steam with a temperature of 120 - 134 °C. Material which may be damaged at this temperature can, in some sterilizer models, be sterilized in formaldehyde vapour at 65 - 80 °C.

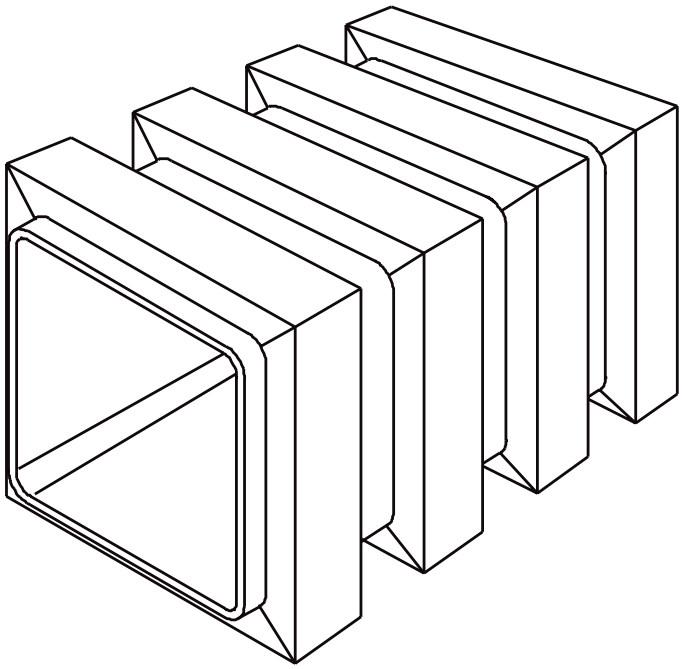
The 2066-sterilizers are intended for processing a great variety o goods such as: instruments, utensils, glass, plastic, leather, textiles, hot or cold liquids in open or vented containers and small rigid pressure tight liquid ampoules. This is done with dedicated programmes.

European Standard EN 285 prescribes the use of fixed programs only. The control equipment of the 2066 sterilizers allows the programs to be varied during testing.

As not only the processes, but also door operation, are controlled automatically, it is not far to full automation of the handling of sterile mate-

rials and goods. The control unit is therefore prepared for controlling a sterilizer having a Getinge ASF automatic loading and unloading unit.

As with Getinge's other double-walled sterilizers, half of the external surface of the chamber is covered by fully-welded U-sections, serving the dual purpose of strengthening the flat walls of the pressure vessel and providing a passage for the steam that keeps the walls of the pressure vessel hot in order to minimise internal condensation. After removal of the thermal insulation, all welds are available for visual inspection.



A vacuumpump of the water ring type removes air, steam and condensate from the chamber. Its sealing water is taken from an open tank which also serves the feed water pump on sterilizers equipped with a built in steam generator.

The condenser between chamber and vacuum pump converts all waste steam to water. This reduction of the pump handling volume speeds up the vacuum producing process and will save the pump and waste piping from high temperatures.

A well silenced drain system after the vacuum pump and the well sized thermal chamber insulation makes the sterilizer an environmentally pleasing unit, easy to locate.

Type 2066 sterilizers require supplies of electricity, cold water, compressed air and steam. If the steam is supplied from a central steam production plant, it is necessary to ensure that the distribution syste incorporates the appropriate pressure reduction valves etc., protected by a safety valve, and that the steam quality is suitable for sterilization purposes.

If central steam is not available or there are reasons not to use it, an electric steam generator, contained within the cabinet volume may be supplied.

CAX044. . . . . GE-Lab, general (before CAM010)

GE-lab is also provided with a fan inside the chamber. In the sterilising of liquids, when jacket cooling is used to cool the load, the fan is used to increase the cooling power from the cooled chamber jacket.

CAX045. . . . . GEE-Fan general

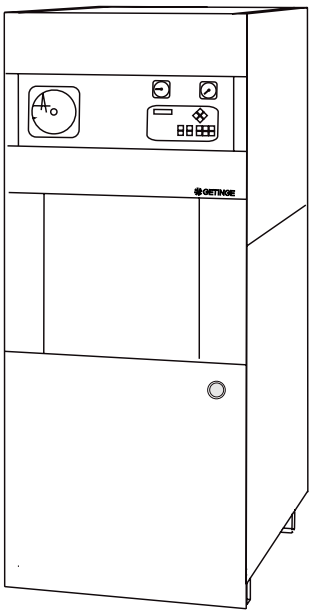
The sterilizer is equipped with an internal fan. This ensures that tha gas in the chamber is properly mixed and that the entire load is exposed independent of location.

CAM010 . . . . . Introduction GEF 449

GEF 449

Sterilizer type GEF 449 is the collective denomination for a range of GETINGE sterilizers with vertically sliding manual doors, all with the door opening 430 x 430 millimetre

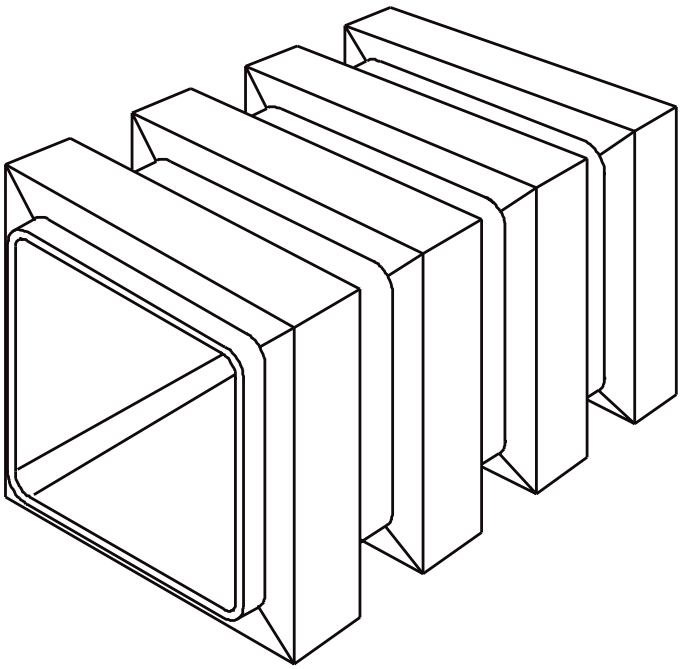
Both single and double ended types exist.



The sterilizers are intended for sterilization of materials in the health service as well as in the industry. Adaptation to respectively task is made mainly by selecting type of control unit. This is built up around a micro processor and therefore provides an almost endless number of processes, all characterized by a very good accuracy in controlling the process parameters. Both instantaneous and set values for a proceeding process may be displayed on request.

Material which may be damaged by a temperature of 120 - 135°C can, in some sterilizer models, be sterilized in formaldehyde vapour at 60 - 80 °C.

The sterilizer chamber, made of acid proof stainless steel is covered externally to about half its area by seal-welded U-profiles which serve both as stiffening bars for the pressure vessel, and as a steam jacket containing temperature controlled steam heating the chamber walls.



A vacuumpump of the water ring type removes air, steam and condensate from the chamber. Its sealing water is taken from an open tank which also serves the feed water pump on sterilizers equipped with a built in steam generator.

The condenser between chamber and vacuum pump converts all waste steam to water. This reduction of the pump handling volume speeds up the vacuum producing process and will save the pump and waste piping from high temperatures.

A well silenced drain system after the vacuum pump and the well sized thermal chamber insulation makes the sterilizer an environmentally pleasing unit, easy to locate.

The type GEF 449 sterilizers should be supplied with electricity, cold water, steam and compressed air. When steam is taken from a central production plant, it is essential that the distribution piping is properly drained.

If central steam is not available or there are reasons not to use it, an electric steam generator, contained within the cabinet volume may be supplied.

Safety devices, a survey

The panels of the sterilizer shall prevent the operator access to the inner parts of the sterilizer. Only specially trained personnel have access to the inner parts.

Safety components

Every sterilizer is equipped with a number of components the purpose of which is to specifically guarantee the human safety. These items are marked with the sign below in:

- **electric diagrams**
- **piping diagrams**
- **spare parts lists**

These components have been subject to special tests before accepted as safety components and must therefore not be substituted by any make or execution not approved by GETINGE AB.
It is of greatest importance that these components are kept in good working condition in order to maintain a safe function during the sterilizer life time.

The sign is used not only to point out important components, but also to emphasize such other safety factors requiring special attention as measurements, tolerances, material etc.

Process stop

Below the front frame above the door there is an emergency stop button. In an emergency, pressing this button makes the sterilizer safe.

If the emergency stop button is operated during a process, an alar sounds.

Trim plates

Panels are possible to dismount by means of tools or keys. The panels form a barrier for operators, but not for specially trained technicians.

Stainless steel surfaces within reach of the operating personnel are insulated so that they are safe to touch.

Valves

Both electric and pneumatically actuated valves are made to close by means of spring force. This prevents undesired flow through the valves in case of power failure. A fail safe function is achieved.

Pressure vessel

The sterilizer chamber, jacket and steam generator are pressure vessels, built in accordance with regulations stipulated by supervising authorities.

The jacket of a sterilizer supplied from main steam is protected against excess pressure by the relief valve compulsory in every main steam supply line. Responsibility for this valve is outside the scope of the sterilizer manufacturer.

The jacket of a steam generator equipped sterilizer is protected against excess pressure by the steam generator relief valve.

The chamber is protected by a relief valve in those cases only when the supply pressure exceeds the chamber design pressure.

Safety valves

The periodical compulsory checking of the steam generator and chamber safety valve functional condition is easily and safely performed by operating a key switch which disconnects the pressure controllers causing the pressure rise to the safety valve opening pressure. See also chapter *Maintenance* in the SERVICE MANUAL.

CAM008 . . . . . Sterilizer with program combination B2001 or B2002.

Doors

The doors are kept closed by the automatic control unit while cycles are in progress and also when supply media fail. The door seals are not pulled back into the seal groove until the condition "*chamber pressure = atmospheric pressure*" is fulfilled, not even in case of an electric failure causing an opening command.

Water level check

Both sight glass and a pilot light on the sterilizer control panel informs about the water content in the steam generator on sterilizers with a built in steam generator. Steam and water flow may, in case the sight glass brakes, be shut of by two valves that can be operated from the front.

Monitoring the load temperature when sterilizing liquids

Via temperature sensors in the load, the doors are kept closed until the temperature of the liquid has fallen below its boiling point.

CAM009 . . . . . Sterilizer with program combination other than B2001 or B2002.

Doors

The doors are kept closed by the automatic control unit while cycles are in progress and also when supply media fail. The doors cannot be opened until the condition “chamber pressure = atmospheric pressure” is fulfilled, not even in case of an electric failure causing an opening command.

Water level check

Both sight glass (if fitted) and a pilot light on the sterilizer control panel informs about the water content in the steam generator on sterilizers with a built in steam generator.

Steam and water flow may, in case the sight glass brakes, be shut of by two valves located behind the lower front panel.

Monitoring the pressure behind the door seal

All valves admitting any medium to the chamber are kept closed until the pressure behind the door seal is high enough to guarantee the tightness of the chamber.

If the pressure falls too low, an alarm sounds.

Monitoring the load temperature when sterilizing liquids

Via temperature sensors in the load, the doors are kept closed until the temperature of the liquid has fallen below its boiling point.
In addition to the control system, the temperature of the load is also controlled by a completely independent system.

CAM012 . . . . . GEF-449 perFORMer safety instructions cont.

Doors

The doors are kept locked while the process is in progress and in the event of any losses of media by a balanced spring system and a mechanical door holder. The doors cannot be opened until the condition "chamber pressure <= atmospheric pressure" is met, even if an electrical fault results in an opening command.

Checking of water level

Both a water-level stand, where provided, and an LED on the control panel provide information on the water level in the steam generator in sterilizers equipped with steam generators.

If the sight glass in the water-level stand breaks, the outflow of water and steam can be shut off using two valves located behind the front sub-panel.

Monitoring of door-seal sealing pressure

All the valves which supply the chamber with some form of medium are kept closed until the pressure behind the door seal is sufficiently high to ensure that the chamber is leaktight.

If the pressure is too low, an alarm is additionally triggered.

CAV005 . . . . . Vertically moving sliding door

Doors

The doors are kept closed by the automatic control unit while cycles are in progress and also when supply media fail. The doors do not open until the condition *chamber pressure = atmopheric pressure* is fulfilled, not even in case of an electric failure causing an opening command. The vertically sliding door is actuated by a compressed air cylinder with a choked air inlet. A much larger outlet is arranged directly at the cylinder end. Objects stopping the upward motion of the door will exert pressure on a plate running the entire length of the top of the door. The plate acts directly upon the outlet valve which opens thereby interrupting the door motion. This will prevent operator injuries and material damage. A brace stops the door from opening in case the pneumatic cylinder should unintentionally become depressurized. The brace can not be removed in case the compressed air pressure is to low to keep the door in the upper position.

CAH001 . . . . . Horizontally moving sliding door Not GEE

Doors

The sterilizer doors are kept closed by the automatic control unit while cycles are in progress and also when supply media fail. The doors do not open until the condition *chamber pressure = atmopheric pressure* is fulfilled, not even in case of an electric failure causing an opening command. The horizontally sliding door is actuated by a pneumatic motor. The force of the pneumatic motor actuating the door is limited so as not to cause any squeeze damage. As an additional safety measure there is a photoelectric device fitted on to the front panel to sense any object which could be pushed toward the chamber wall by the door motion.

The photoelectric device stops the door-motion before a squeeze-situation occurs, thereby avoiding personal and material damage.

When closing a door the door push button has to be pressed during the entire door closing period. The door stops automatically if the button is released before the door is properly closed.

CAH011. . . . . Horizontally moving sliding door Not GEE

Doors

The sterilizer doors are kept closed by the automatic control unit while cycles are in progress and also when supply media fail. The doors do not open until the condition *chamber pressure = atmopheric pressure* is fulfilled, not even in case of an electric failure causing an opening command. The horizontally sliding door is actuated by a pneumatic motor. The force of the pneumatic motor actuating the door is limited so as not to cause any squeeze damage. As an additional safety measure there is a load sensor fitted on the pneumatic motor, to sense any bigger object obstructing the door closing. The load sensor stops the door-motion before a squeeze-situation occurs, thereby avoiding personal and material damage.

When closing a door the door push button has to be pressed during the entire door closing period. The door stops automatically if the button is released before the door is properly closed.

CAH007 . . . . . GEE horizontally moving sliding door

Doors

The doors are kept closed by the automatic control unit while cycles are in progress and also when supply media fail. The doors can not be opened until the condition *chamber pressure = atmopheric pressure* is fulfilled, not even in case of an electric failure causing a command to unlock.

The horizontally sliding door is actuated by a pneumatic motor. The force of the pneumatic motor actuating the door is limited so as not to cause any squeeze damage.

Stainless steel surfaces which the operating personnel may come in contact with are insulated and cooled to a harmless temperature.

CAV010. . . . . GEE Vertical sliding door Safety

Doors

The doors are kept locked while the process is in progress and in the event of any losses of media by the automatic control equipment. The doors will not open until the "chamber pressure = atmospheric pressure"

condition is met, even if an electrical fault were to result in an opening command.

The sliding doors are operated with a compressed-air cylinder which has a substantially narrowed inlet. An outlet valve with a considerably greater throughflow capacity than the inlet is located in the bottom of the cylinder, which faces up. Objects which prevent the upward movement of the door press down a sheet-metal disc which opens the outlet valve so that movement of the door stops. An outlet valve with a considerably greater throughflow capacity than the inlet is located in the bottom of the cylinder, which faces up. Objects which prevent the upward movement of the door press down a sheet-metal disc which opens the outlet valve so that movement of the door stops. The stainless steel panels which personnel may touch are insulated and cooled to a non-dangerous temperature.

The stainless steel panels which personnel may touch are insulated and cooled to a non-dangerous temperature.

CAH009 . . . . . GEE, low-pressure, horizontal door

Special attention has been paid to make a tight seal between door and chamber. The door seal system consists of two seals placed in one groove each around the door opening. One of the seals is pushed against the door surface by means of pressurized nitrogen or compressed air. The other seal is fixed, and tightens against the door when the vacuum in the chamber sucks the door against the chamber.

CAV009 . . . . . GEE Vertical sliding door General

Special steps have been taken to make the seal between the door and chamber secure. The door seal consists of a packing and a mechanical locking system.

CAH008 . . . . . GEE high pressure, horizontal door

Special attention has been paid to make a tight seal between door and chamber.
The door seal system consists of two seals placed in one groove each around the door opening. The seals are pushed against the door surface by means of compressed air (or pressurized nitrogen when explosion proof).

CAH010 . . . . . GEE general

The effectiveness of the seal is supervised by the space between the two seals being evacuated by an ejector and the vacuum created measured by a pressure sensing device. If the ejector should not be capable of maintaining the stipulated vacuum, the pressure sensor will trigger an alarm resulting in the sterilizer being evacuated.

Water level supervision

Both expansion vessel and water pump recirculation tank are equipped with sight glass making it possible to check the appropriate water levels.

CAV011 . . . . . GEE Vertical sliding door Seal

The effectiveness of the seal is checked to starting each process with a leakage test.

Checking of water level

Both the expansion vessel and the tank of the vacuum pump for circulating sealing water are provided with a level sensor which actuates an alarm if the water level is too low.

CAX004. . . . . General

Emergency stop

In the front panel, at the side of the door, there is a push button mounted having dual functions:

A **While actuating the door:**
to stop the door motion immediately.
A push on the button releases an alarm resulting in the door not moving

B **While the door is closed:**
During a proceeding process. The process is aborted and all valves for media to the chamber closes. This releases an alarm.

CAX037. . . . . General, with cleaning key

Door interlock key

The front panel contains a key switch, intended for use when cleaning the sterilizer or when it is necessary to reach into the chamber for any reason.
With the key removed, the door cannot be closed. See also unde "Cleaning the chamber" in the OPERATIONS chapter.

CAH002 . . . . . Sterilizer with chamber that can be entered

Door blockage key

In the front panel, next to the door, a pneumatic key switch is mounted. Whoever entering the autoclave chamber shall bring the key. When removed from the key switch, the door is pneumatically blocked from possibilities to close.

CAH014 . . . . . Autoclaves with chamber which permits entry

Door-blocking key

There is a pneumatic key switch on the front panel alongside the door. Anyone entering the autoclave chamber should take the key with them. When the key is removed from the key switch, closing of the door is blocked pneumatically. See also the sub-section headed "Cleaning of chamber" in the section entitled "OPERATION".

CAV007 . . . . . Sterilizer with chamber that can be entered

Door interlock key

In the front panel, next to the door, a key switch is mounted. Whoever entering the autoclave chamber shall bring the key. When removed from the key switch, the door is blocked from possibilities to close.

CAX005 . . . . . General

Trim plates

Panels are possible to dismount by means of tools or keys. The panels form a barrier for operators, but not for specially trained technicians. Stainless steel surfaces within reach of the operating personnel are insulated and cooled to a harmless temperature.

Valves

Normally electric and pneumatically actuated valves are made to close by means of spring force. This prevents undesired flow through the valves in case of power failure. A fail safe function is achieved.

CAH015 . . . . . Sideways-opening doors, general

Lining plates

Front panels and lining panels may only be opened by specially trained technicians, not by operators. Plate surfaces with which the operator may come into contact are insulated and cooled to a temperature a which it is safe to touch.

Valves

Both electrically and pneumatically controlled valves are closed by spring force. This means that non-permitted flow of steam, water or

gases is prevented if the control medium is lost. The principle is that the valves move to a safe position in the event of a loss of medium.

CAX006. . . . . GEC A-version

Pressure vessel

The sterilizer chamber and jacket are pressure vessels, built in accordance with regulations stipulated by supervising authorities.

Main steam supply is to be protected against excess pressure by the safety valve, compulsory in every main steam supply line. Responsibility for this valve is outside the scope of the sterilizer manufacturer.

Due to high compressed air pressure, the autoclave chamber is protected by a separate safety valve mounted on the chamber.

CAX038. . . . . GE, general, A-version

Pressure vessel

The sterilizer chamber and jacket are pressure vessels, built in accordance with regulations stipulated by supervising authorities.

Main steam supply is to be protected against excess pressure by the safety valve, compulsory in every main steam supply line. Responsibility for this valve is outside the scope of the sterilizer manufacturer.

CAH012 . . . . . Pressure vessel GED

Pressure vessel

The chamber and jacket are pressure vessels, built in accordance with regulations stipulated by supervising authorities.

Main steam supply is to be protected against excess pressure by the safety valve, compulsory in every main steam supply line. Responsibility for this valve is outside the scope of the sterilizer manufacturer.

The autoclave chamber is protected by a separate safety valve mounted on the chamber.

CAX007. . . . . GEC E-version with vacuum process

Pressure vessel

The sterilizer chamber, jacket and steam generator are pressure vessels, built in accordance with regulations stipulated by supervising authorities.

The steam supply is protected against excess pressure by the safety valve, mounted on the steam generator. The jacket of the sterilizer is protected against excess pressure by the steam generator safety valve.

The autoclave chamber is protected by a separate safety valve mounted on the chamber.

CAH016 . . . . . GE E version with 3.5 bar safety valve

Pressure vessel

The autoclave chamber, jacket and steam generator are pressure vessels designed and built in accordance with applicable standards.

Each pressure vessel has a separate safety valve to provide protection against excessively high pressure.

CAX008 . . . . . GEC E-version without vacuum process

Pressure vessel

The sterilizer chamber, jacket and steam generator are pressure vessels, built in accordance with regulations stipulated by supervising authorities.

The steam supply is protected against excess pressure by the safety valve, mounted on the steam generator.

Due to high compressed air pressure, the autoclave chamber is protected by a separate safety valve mounted on the chamber.

CAX039 . . . . . General for safety valves

Safety valves

Safety valves limit the system pressure, providing the last line of protection to prevent the design pressure of the vessel from being exceeded. Safety valves are required to be inspected at prescribed intervals.

CAX009 . . . . . General E-version

Safety valve, steam generator

The periodical compulsory checking of a built in steam generator safety valve functional condition is easily and safely performed. It is done by operating a key switch which disconnects the pressure controllers causing the pressure rise to the safety valve opening pressure.

Water level check, steam generator

Both sight glass and a pilot light on the sterilizer control panel informs about the water content in the steam generator. Steam and water flow may, in case the sight glass brakes, be shut of by two valves.

CAX010. . . . . . General

Monitoring the pressure behind the door seal

All valves admitting any medium to the chamber are kept closed until the pressure behind the door seal is high enough to guarantee the tightness of the chamber.

Monitoring the load temperature when sterilizing liquids

Via temperature sensors in the load, the doors are kept closed until the temperature of the liquid has fallen below its boiling point.

CAH013 . . . . . General GED

Monitoring the pressure behind the door seal

All valves admitting any medium to the chamber are kept closed until the pressure behind the door seal is high enough to guarantee the tightness of the chamber.

CAX040. . . . . General, liquid sterilization (CAX010)

Monitoring the load temperature when sterilizing liquids

Via temperature sensors in the load, the doors are kept closed until the temperature of the liquid has fallen below its boiling point.

CAX041. . . . . Formaldehyde

Emergency program when sterilizing using formaldehyde

In the event of abnormal operating conditions, when the temperature or pressure conditions in the sterilizer chamber could damage the load or cause danger, an emergency program operates to terminate the process quickly.

Ventilation monitoring

An international standard recommends that the ventilation system of formalin sterilizers should be monitored using a flow switch.

The sterilizer is prepared for the fitting of such a flow switch, which then forms part of the safety interlocks.

CAX049 . . . . . perFORMer,emergency program, bottle guard, ventilation monitoring

Emergency program in formalin sterilization

In abnormal operating situations when there is a risk of the temperature and pressure conditions in the sterilizer chamber damaging the load or creating a danger, an emergency program comes into operation which rapidly completes the process.

Bottle guard in formalin sterilization

A bottle guard prevents the formalin program from being started or carried out if a bottle has not been positioned in the bottle holder.

Ventilation monitoring

The international standard recommends that the ventilation syste around formalin sterilizers should be monitored by a flow monitor.
The sterilizer is prepared for the connection of a flow monitor, which after being connected becomes part of the safety interlocking system.

CAA005 . . . . . Integral steam generator

Pressure limitation

The operating pressure of the steam generator is restricted by a pressure switch that interrupts the electricity supply to the steam generator at a pressure of about 0.5 bar(g) below the opening pressure of the safety valve.

Boil-dry protection

In the event of failure of the water supply, the boil-dry protection interrupts the electrical supply when the water level falls to a certain level.

Overheating protection

This protection prevents the steam generator from overheating if the boil-dry protection should fail to operate.

Reset push-button

After operation of any of the steam generator safety devices, the fault must be rectified and the alarm reset manually in accordance with current regulations for steam pressure vessels.

Water level monitoring

An LED in the sterilizer instrument panel indicates satisfactory water level in the steam generator. On certain models, the water level can also be seen in the steam generator sight glass.

Safety switch

It must be possible to interrupt all electrical supplies to the steam generator by means of a safety switch. See also the INSTALLATION chapter.

CAA006. . . . . Built-in steam generator

Pressure limitation

The operating pressure of the steam generator is checked by a pressure switch which cuts the power supply when the pressure rises to approx. 0.5 bar (e) below the opening pressure of the safety valve.

Boil-dry protection

If the water is not topped up, the boil-dry protection cuts the power supply when the water level falls below a particular limit.

Overheating protection

This protection prevents overheating if the boil-dry protection fails to work.

Resetting button

If a fault is triggered by any of the safety components of the steam generator, the fault must be manually reset in accordance with applicable regulations on steam boilers.

Water-level monitoring

An LED on the instrument panel of the connected autoclave indicates a satisfactory water level in the steam generator. The level can also be read off on the water-level stand of the steam generator on some mod-

els. This stand is provided with two valves which can be closed to prevent water and steam from escaping if the sight glass bursts.

Safety switch

It must be possible for all power supply to the steam generator to be cut with a safety switch. See also the section on INSTALLATION.

CAA004 . . . . . Steam converter. Water level monitoring

Water level monitoring

An LED in the sterilizer instrument panel indicates satisfactory water level in the steam generator. On certain models, the water level can also be seen in the steam generator sight glass.

THE PROCESS

DAX013 . . . . . GEV general

The GEV-process

The process starts by the door seal being pressed towards the door by means of compressed air.

DAX014 . . . . . GEV direct heating

Heating the load

The fan starts as soon as all start conditions are fulfilled. The load is heated by means of steam which is admitted into the chamber so as to cause a direct contact with the load. The amount of steam is controlled by the control unit, to give the required gradual increasing of the chamber and load temperatures.

The fan recirculates the air-steam mixture over the load during the whole process. This continuous circulation of the atmosphere gives a very uniform chamber temperature during all stages of the process Forming of layers of air and steam is eliminated due to the turbulence in the chamber.

DAX015 . . . . . GEV indirect heating

Heating the load

The fan starts immediately when all start conditions are fulfilled. In some processes the load is preheated by means of hot air. This air is heated by entering steam into the heat exchangers in the chamber. This preheating will reduce the condensation of steam on the load.

After the preheating, steam is admitted into the chamber so as to cause a direct contact between steam and load. The amount of steam is controlled by the control unit, to give the required gradual increasing of the chamber and load temperatures. The fan recirculates the air-steam mixture over the load during the whole process. This continuous circulation of the atmosphere gives a very uniform chamber temperature during all stages of the process. Forming of layers of air and steam is eliminated thanks to the turbulence in the chamber.

DAX028 . . . . . GEV Indirect heating, jacket heating

Heating the load

The fan starts immediately when all start conditions are fulfilled. In some processes the load is preheated by means of hot air. This air is heated by entering steam into the jacket of the chamber. This preheating will reduce the condensation of steam on the load.

After the preheating, steam is admitted into the chamber so as to cause a direct contact between steam and load. The amount of steam is controlled by the control unit, to give the required gradual increasing of the chamber and load temperatures. The fan recirculates the air-steam mixture over the load during the whole process. This continuous circulation of the atmosphere gives a very uniform chamber temperature during all stages of the process. Forming of layers of air and steam is eliminated thanks to the turbulence in the chamber.

DAX016 . . . . . GEV general

Sterilization period

Autoclave chamber and load is heated to sterilization temperature and kept at this temperature for the stipulated time or until the required F_0-value is reached.

Cooling

The cooling starts after completed sterilization period. A gradual lowering of the load temperature is achieved by cooling down the circulating air when passing the heat exchanger. The speed of the cooling can be controlled within wide limits.

Process end

When the temperature in the load has reached the predetermined final temperature the fan(s) stops. The pressure is let down to atmospheric. The door seal will then be withdrawn into its groove by vacuum. The sterilizer will remain in this state until the unloading door is opened.

Chamber pressure during the process.

During the heating, sterilization and cooling phases of the cycle, an air support pressure following a programmed pattern can be applied to the chamber to balance pressure differences between the chamber and the inside of the packages. This is to prevent distortion or damage to the containers or their closures.

DAX007 . . . . . GEC general

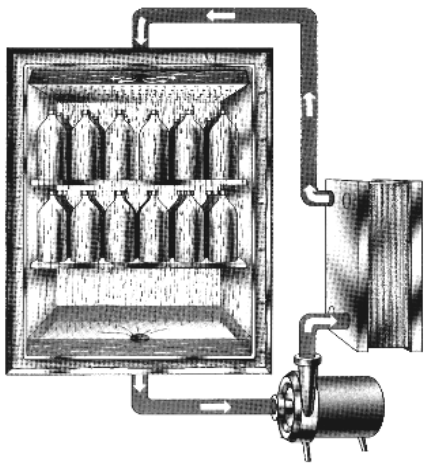
The GEC-process

The process starts by the door seal being pressed towards the door by means of compressed air.

Water filling

Next phase is filling the sterilizer chamber with process-water up to a controlled level. Only a minor portion of the chamber is filled with water. Depending upon the product requirement, the quality of the process-water may be of a high standard such as WFI (Water For Injection).

A centrifugal pump recirculates the water which is continuously sprayed over the load during the whole process. The continuous spraying of water gives a very uniform chamber temperature during all stages of the process.



DAX008 . . . . . GEC direct heating

Heating the load

The load is heated by means of steam. The steam is admitted into the chamber so as to cause a direct contact between steam, goods and water. The amount of steam is controlled by the control unit, to give the required gradual increasing of the chamber and load temperatures.

DAX009 . . . . . GEC indirect heating

Heating the load

The system is heated by means of steam. The steam heats the process water in the heat exchanger, thereby eliminating the risk of the water being contaminated with chemicals or foreign particles. The warmed process water will heat the load when passing through the autoclave chamber.

The amount of steam is controlled by the control unit, to give the required gradual increasing of the chamber and load temperatures.

DAX010 . . . . . GEC general

Sterilization period

Process water, autoclave chamber and load is heated to sterilization temperature and kept at this temperature for the stipulated time or until the required F_0-value is reached.

Cooling

The cooling starts when the sterilization period has been completed. A gradual lowering of the load temperature is achieved by cooling down the circulating process water when passing the heat exchanger. The speed of the cooling can be controlled within wide limits. The heat exchanger ensures that process-water and cooling-water are neve mixed.

Process end

When the temperature in the load has reached the predetermined final temperature the circulation pump stops. The water in the chamber i drained out and the pressure is let down to atmospheric. The door seal will then be withdrawn into its groove by vacuum. The sterilizer will remain in this state until the unloading door is opened.

Chamber pressure during the process

During the heating, sterilization and cooling phases of the cycle, an air support pressure following a programmed pattern can be applied to the chamber to balance pressure differences between the chamber and the inside of the packages. This is to prevent distortion or damage to the containers or their closures.

The ethylene oxide process

A vacuum pump of the water ring type removes air, steam and condensate from the chamber. The pump sealing water is taken from and exhausted to one and the same container thereby forming a closed system not permitting gas-contaminated water leaving the sterilizer uncontrolled.

Gas exhausted from the sterilizer and evaporating from the recirculating sealing water is also collected in the container and fed to the destruction unit or to the open air through a sealed tube.

An alarm system with visible and audible signals cover most irregular situations which may occur. Simultaneously this system automatically introduces an emergency program, adapted to the process cut point, which brings the process safely to an end.

Pretreatment

AIR REMOVAL
It is important that the sterilant comes in close contact with the microorganisms to be killed. Any air present serves as an insulation which prevents the desired contact and lowers the temperature.

A pretreatment phase consisting of a number of pressure variations following a certain pattern effectively removes air from various types of goods.

LEAK TEST
The chamber has to be absolutely tight during the comparatively long process time of an ethylene oxide sterilisation. Each process therefore starts with a leak test which has to be satisfactory to let the sterilizing cycle proceed.

HUMIDIFICATION
It has been generally accepted that moisture is an essential element in achieving sterility when autoclaving. The steam admitted between the evacuation periods during the air removal stage will not humidify the goods to the desired extent. The chamber therefore is kept filled with saturated steam at a pressure corresponding to the chamber wall temperature for a period of time selected by the operator. This time may vary with different kinds of load and type of biological indicators.

Sterilizing

The gas sterilant stored as a liquid in a gas bottle is admitted via an evaporator to produce an ethylene oxide concentration of about 650 mg/litre in the chamber. The sterilizing temperature is kept at predetermined level by controlling the heat admitted to the jacket and the gas. The sterilizing time, adapted to the type of goods to be processed, is set by the operator.

Post treatment

The the objective of the post treatment, consisting of repeated evacuations and admissions of sterile filtered air/nitrogen, is primarily to extract the gas from the goods and to normalize the temperature and moisture content of it.

The goods will, in spite of this treatment, retain some ethylene oxide which may be hazardous to humans. After a gas sterilization, materials should therefore be aerated in a well ventilated area at room temperature for a period of time which may vary between 24 hours and seven days depending on type of goods. The time can be shortened if the goods is aerated in a heated, ventilated cabinet specially designed for this purpose.

DAX023 . . . . . Description of the steam sterilization process. Hospital div.

The steam process

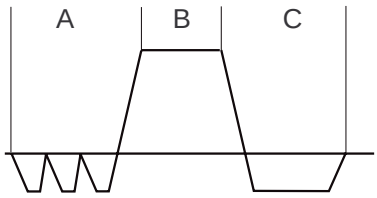
The phase list, in the SERVICE MANUAL, is the only document which in detail describes the processes. This phase list is mainly intended for the technicians.

The universal steam-autoclaving process can be divided into three main phases:

A Pretreatment

B Sterilizing

C Post-treatment



Pretreatment

It has been generally accepted that moisture is an essential element in achieving sterility with steam. Therefore it is important that the steam comes in close contact with the microorganisms to be killed. Any air present serves as an isolator preventing the desired situation besides its ability to lower the temperature.

A pretreatment phase consisting of a number of pressure variations following a certain pattern effectively removes air from various types of goods simultaneously producing the moisture required prior to the subsequent sterilizing phase.

Air removal when autoclaving aqueous solutions in open containers is made by a single provocateur or flowing steam in order not to make the liquid come to boiling during the decompression periods in a pulsating procedure.

Sterilizing

For sterilizers equipped with the computerized control unit, the sterilizing time starts at the instant in the pretreatment phase of the process when the chamber temperature transducer signals a temperature equal to or higher than the sterilizing temperature specified for the current program. If the temperature transducer registers a value outside the temperature band, or if the temperature differs by more than ±1.5K fr om the chosen sterilizing temperature, an alarm sounds.

When sterilizing goods, in particular liquids, where the sterilizing temperature is measured in the goods, the transducer “Control temp 1” is used. The condition for starting the sterilizing timer is that both transducers, “Chamber” and “Control temperature 1”, detect the programmed sterilizing temperature.

Post-treatment

The post-treatment is intended to normalize the temperature and moisture content of the goods. All types of goods except liquids therefore are exposed to a vacuum deeper than 70 mbar(a) for a certain period of time. Textiles may after such a post-treatment still appear to increase in weight by about 1% which consequently represents a normal wate addition during a sterilization process.

The post-treatment of aqueous solutions sterilized in open or vented containers consists of a period of natural cooling while pressure and temperature are lowered slowly until the temperature of the liquid is safely below its boiling point. This process is speeded up by applying a slight vacuum to the chamber when its pressure approaches atmospheric.

NOTE that liquids must only be processed in sterilizers which are equipped with program for this type of load.

Pressure equalization from vacuum takes place by admitting atmospheric air into the chamber via a filter that prevents bacteria from entering the chamber. The efficiency of the filter is 99.998% for particles of order of size 0.3 micron (0.0003 mm).

The sterilizer door will remain sealed by its gasket until atmospheric pressure prevails in the chamber.

Process adaptation

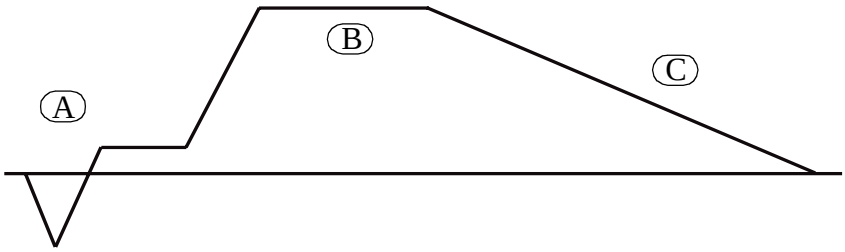
A large number of factors such as type of goods, goods carrier, packaging material, etc. affect the result of the process. The control equipment offers a number of features that can be used to optimize the processes to suit the requirements of different customers. For further information, see “Customer-programmable functions” in the SERVICE MANUAL.

DAX011. . . . . Vacuum cycle

Steam/vacuum-process

As the sterilizer is equipped with a vacuum pump it can serve as an ordinary steam sterilizer, suitable for sterilization of utensils, containers, textiles etc.

The universal steam/vacuum process can be divided into pretreatment (A), sterilizing (B) and post-treatment (C).



Pretreatment

It has been generally accepted that moisture is an essential element in achieving sterility with steam. Therefore it is important that the steam comes in close contact with the microorganisms to be killed. Any air present serves as an insulation which prevents the contact and lowers the temperature.

A pretreatment phase, consisting of a number of pressure variations following a certain pattern, effectively removes air from various types of goods and produces the moisture required in the subsequent sterilizing phase.

Air removal when autoclaving aqueous solutions in open containers is made by a single prevacuum or flowing steam in order to avoid that the liquid comes to boiling during the decompression periods in a pulsating procedure.

Sterilizing

Counting the sterilizing time starts from the moment when the chamber temperature transducer signals a temperature equal to or higher than the chamber temperature set point. Count down of the sterilizing time stops at temperatures below this threshold temperature.

When sterilizing goods, in particular liquids, where the sterilizing temperature is measured in the goods, load sensors are used. The condition for starting the sterilizing timer is that chamber sensor and all load sensors indicate a temperature equal to or above nominal sterilizing temperature

Posttreatment

The posttreatment is intended to normalize the temperature and moisture content of the goods. All types of goods except liquids therefore are exposed to a deep vacuum for a certain period of time.

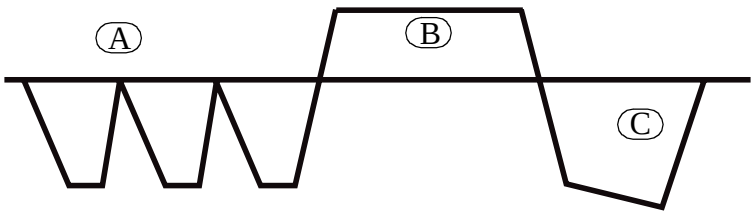
The posttreatment of aqueous solutions sterilized in open or vented containers consists of a period of natural cooling while pressure and temperature are lowered slowly until the temperature of the liquid is safely below its boiling point. This process is speeded up by applying a slight vacuum to the chamber when its pressure approaches atmospheric.

The sterilizer door will remain sealed by its gasket until atmospheric pressure prevails in the chamber.

DAH001 . . . . . GED Vacuum cycle

Steam/vacuum-process

The universal steam/vacuum process can be divided into pretreatment (A), disinfection (B) and post-treatment (C).



Pretreatment

It has been generally accepted that moisture is an essential element in achieving sterility with steam. Therefore it is important that the steam comes in close contact with the microorganisms to be killed. Any air present serves as an insulation which prevents the contact and lowers the temperature.

A pretreatment phase, consisting of a number of pressure variations following a certain pattern, effectively removes air from various types of goods and produces the moisture required in the subsequent sterilizing phase.

DAH002 . . . . . GED Outlet filter

Air expelled from the chamber during the pretreatment stage of the process is filtered through a sterile filter before it is allowed out in the service area.

DAH003 . . . . . GED steam/vacuum process (cont.)

Disinfection

Counting the disinfection time starts from the moment when the chamber temperature transducer signals a temperature equal to or higher than the chamber temperature set point. Count down of the disinfection time stops at temperatures below this threshold temperature.

Posttreatment

The posttreatment is intended to normalize the temperature and moisture content of the goods. All types of goods therefore are exposed to a deep vacuum for a certain period of time.

The autoclave door will remain sealed by its gasket until atmospheric pressure prevails in the chamber.

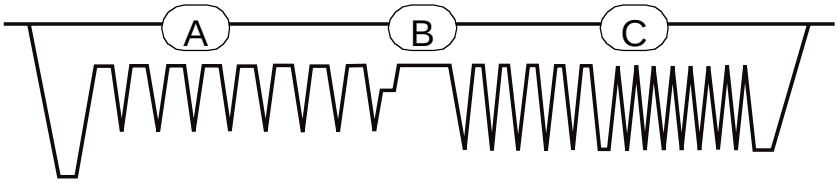
DAX030 . . . . . Formaldehyde process GED

The formaldehyde process

The Getinge formaldehyde autoclave is intended for sterilization of heat sensitive goods which can not be processed in a conventional stea sterilizer. The formaldehyde process is developed to be effective on plain surfaces as well as in cavities and deep lumina at a temperature not exceeding 60 ^{o}C, 65^{o}C or 80 ^{o}C alternatively.

The active sterilizing agent is formaldehyde, a non visible gas with an unmistakable pungent odour. It is easily solved in water to about 40% at room temperature. When solved in water it is sometimes called formalin. Gas and water can be separated by heating the solution. Some people are predisposed to allergies caused by formaldehyde even a very low concentrations and therefore great care is necessary when handling this material.

The process is graphically described below.



A = Pretreatment
B = Sterilization
C = Posttreatment

Before the formaldehyde is admitted, the goods are subject to a pretreatment consisting of repeated evacuations and steam flushes. This procedure aims at removing air from the goods, heating them and humidifying the microorganisms to make them susceptible to formaldehyde.

At the beginning of the sterilizing phase the formaldehyde is introduced to the process by admitting formaldehyde solution from a punctured injection flask. The formaldehyde is transferred to a steam heated cavity where it is evaporated before it continues into the chamber in the state of a gas. Steam then is added to keep the temperature at predetermined constant level. Penetration to all parts of the chamber and load is facilitated by the continuous vacuum prevailing in the chamber during the whole process. Circulating hot water, or steam at vacuum conditions in the chamber jacket keeps the chamber walls warm, thereby preventing condensate forming on these.

Upon the predetermined sterilizing holding time expiring, the posttreatment takes place. This aims at effectively removing the formaldehyde from the goods and is achieved by a number of repeated vacuums and intermediate steam flushes.

The process ends up with a deep vacuum followed by a number of pulsating air flushes via the air-in filter. This part of the process is to remove remaining small amount of formaldehyde residuals in the goods and the chamber and to restore the humidity and temperature of the goods.

DAX034 . . . . . Formaldehyde process, hospital

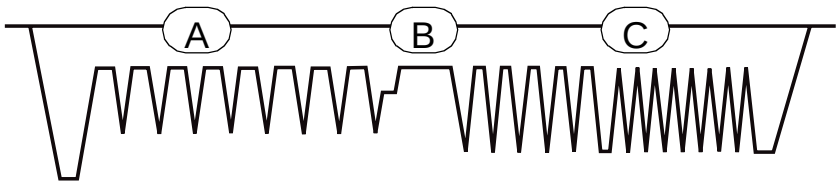
The formaldehyde process

The Getinge formaldehyde autoclave is intended for sterilization of heat sensitive goods which can not be processed in a conventional steam sterilizer. The sequences of the process are such that it is effective for use with both porous and solid materials, as well as on open surfaces, hollows and narrow lumens. The sterilization temperature is 80°C, but the process can be operated with 65°C[1] as the maximum temperature.

1. 60°C on certain models

The active sterilizing agent is formaldehyde, a non visible gas with an unmistakable pungent odour. It is easily solved in water to about 40% at room temperature. When solved in water it is sometimes called formalin. Gas and water can be separated by heating the solution. Some people are predisposed to allergies caused by formaldehyde even a very low concentrations and therefore great care is necessary when handling this material.

The process is graphically described below.



A = Pretreatment
B = Sterilization
C = Posttreatment

Before the formaldehyde is admitted, the goods are subject to a pretreatment consisting of repeated evacuations and steam flushes. This procedure aims at removing air from the goods, heating them and humidifying the microorganisms to make them susceptible to formaldehyde.

In connection with the steam flushes, formaldehyde is admitted to the chamber as follows. An injection flask, containing a solution of formaldehyde in water (formalin), is punctured by a needle, allowing the formalin to be drawn into a steam-heated evaporator connected to the chamber. The evaporator drives off the formaldehyde from the formalin solution, from which it is drawn into the chamber by the vacuum there, and which is maintained in the chamber throughout the entire process. Steam is admitted after the formaldehyde admission, to maintain the chamber temperature at the correct value. The walls of the chamber are heated externally by steam, preventing condensation from forming internally.

On conclusion of the prescribed dwell time, the chamber is evacuated and temperature-controlled steam again admitted. This evacuation, followed by steam admission, is repeated many times. This part of the process, referred to as washing, effectively removes any traces of formalin from the goods, which is of vital importance when bearing in mind the risks of formaldehyde allergy.

The process ends up with a deep vacuum followed by a number of pulsating air flushes via the air-in filter. This part of the process is to remove remaining small amount of formaldehyde residuals in the goods and the chamber and to restore the humidity and temperature of the goods.

DAX038 . . . . . Killing process

Killing process.

The sterilizer is provided with one or more processes for killing in which the gases leaving the sterilizer chamber are also sterilized.

The steam enters at the bottom of the chamber so that the condensate and any product residues that have accumulated there are heated and sterilized. Steam, air and gases leave the chamber via connections on the side of the sterilizer. This steam/gas mixture passes through a sterile-filtering filter before it reaches the sterilizer's condenser.

During the sterile phase the filter is kept at sterilization temperature and the material that becomes caught in it is therefore sterilized.

In the post-treatment, after the sterile phase, the ordinary outlet in the bottom of the chamber is used to drain the condensate that has accumulated there.

In those cases where a killing process does not perform ordinary pre-treatment and sterile phases correctly, post-treatment (evacuation/pressure equalization) takes place through the filter. The doors cannot then be opened until a correct killing process has been performed.

DAX012 . . . . . GEC / GEV with vacuumpump and program for leak test

Chamber leak test

The autoclave is equipped with a program for automatic leak test of the autoclave chamber. A leak test shall be performed with empty chamber.

The leak test process has its own program number (See list of programs).

The vacuum pump evacuates the chamber. The pump stops when a deep vacuum is reached. For a short period of time after this evacuation a slight rise of the chamber pressure takes place which is not due to leakage but results from evaporation of condensate and temperature - pressure changes of the recently rarefied residual steam.

A chamber pressure rise caused by air leakage can not be detected until the conditions in the chamber are stable. Not earlier than 5 minutes after the vacuum pump has stopped should the pressure and time be measured.

A satisfactory leak test allows for a maximum permissible pressure raise of 13 mbar / 10 minutes. A failed leak test will result in an alarm.

Test period

DAX017 . . . . . Hot leak test

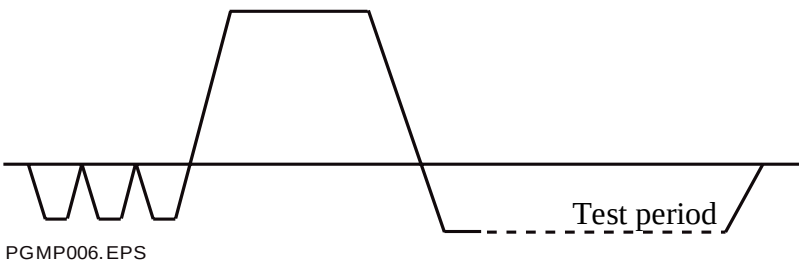
Chamber leak test

The autoclave is equipped with a program for automatic leak test of the autoclave chamber. A leak test shall be performed with a preheated sterilizer and with empty chamber. The leak test process has its own program number (See list of programs).

The vacuum pump starts and evacuates the air from the chamber. This is done in three evacuations and entering steam between each evacuation. After the last of the three evacuations the chamber is heated to working temperature and kept at this temperature for stabilization. Then the vacuumpump is started once more. The pump stops when a deep vacuum is reached in the chamber.

For a short period of time after this evacuation a slight rise of the chamber pressure takes place which is not due to leakage but results from evaporation of condensate and temperature - pressure changes of the recently rarefied residual steam.

A chamber pressure rise caused by air leakage can not be detected until the conditions in the chamber are stable. Not earlier than 5 minutes after the vacuum pump has stopped should the pressure and time be measured. A satisfactory leak test allows for a maximum permissible pressure raise of 13 mbar / 10 minutes. A failed leak test will result in an alarm.



Leak test

All program combinations include a program for checking the tightness of the sterilizer. This test, known as a leak rate test or simply leak test, is used to reveal leaks in the system that might lead to air entering the chamber and putting sterility at risk.

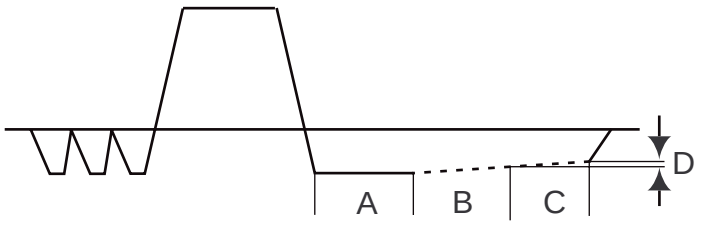
The test is done with the sterilizer empty and with a vacuum in the chamber. A check pressure gauge that should meet the requirements of EN285 and a stopwatch are needed. The pressure gauge is connected to the VT connection of the chamber and must be fitted with a valve so that the connection to the chamber can be shut of while there is a positive pressure inside it.

Semiautomatic leak test with warm sterilizer
The checking process has its own program button (see list of available programs) which starts a process and stops it when the programmed dry vacuum time has elapsed. After the vacuum pump stops, the pressure in the chamber rises for a time. This is not due to leakage but to condensate in the chamber boiling and to diluted residual steam expanding again when the temperature in the chamber equalizes.

Perform the following actions when the vacuum pump stops:

- Open the shut-off valve to the check pressure gauge.
- Wait about ten minutes until the lamp in the start button starts to flash.
- Note the pressure reading of the check pressure gauge and start the stopwatch.
- Wait ten minutes and note the check gauge reading again.
- The sterilizer passes the test if the pressure rise does not exceed 13 mbar.
- Press the start button to terminate the test.

On double-ended sterilizers, when the leakage test is complete *the loading door* opens automatically or manually depending on how its was programmed.



A Normal post-vacuum 5 min.

B Stabilization of chamber atmosphere 10 min.

C Check time 10 min.

D Pressure rise.

DAX025 . . . . . Automatic leak rate test. Hospital division

Leak test

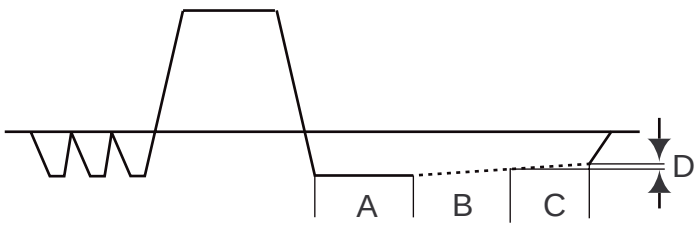
Automatic process for steam sterilizers
With sterilizers equipped with a pressure transducer the leak test can easily be automatically performed. The leak test shall be performed with empty chamber.

The checking process has its own program button (See list of programs) which starts one of the standard processes contained by the control unit in question, but aborts this at a moment when the vacuum pump has created a deep vacuum in the chamber. For a short period of time after this evacuation a slight rise of the chamber pressure takes place which is not due to leakage but results from evaporation of condensate and temperature - pressure changes of the recently rarefied residua steam.

A chamber pressure rise caused by air leakage can not be established until the conditions in the chamber are stable. Not earlier than 10 minutes after the vacuum pump has stopped should the pressure and time be measured.

A satisfactory leak test allows for a maximum permissible pressure raise of 13 mbar / 10 m.

With double ended sterilizers, *the loading door* opens after a completed leak test either automatically or manually, depending on the type of programming made.



A Normal post-vacuum 5 min.

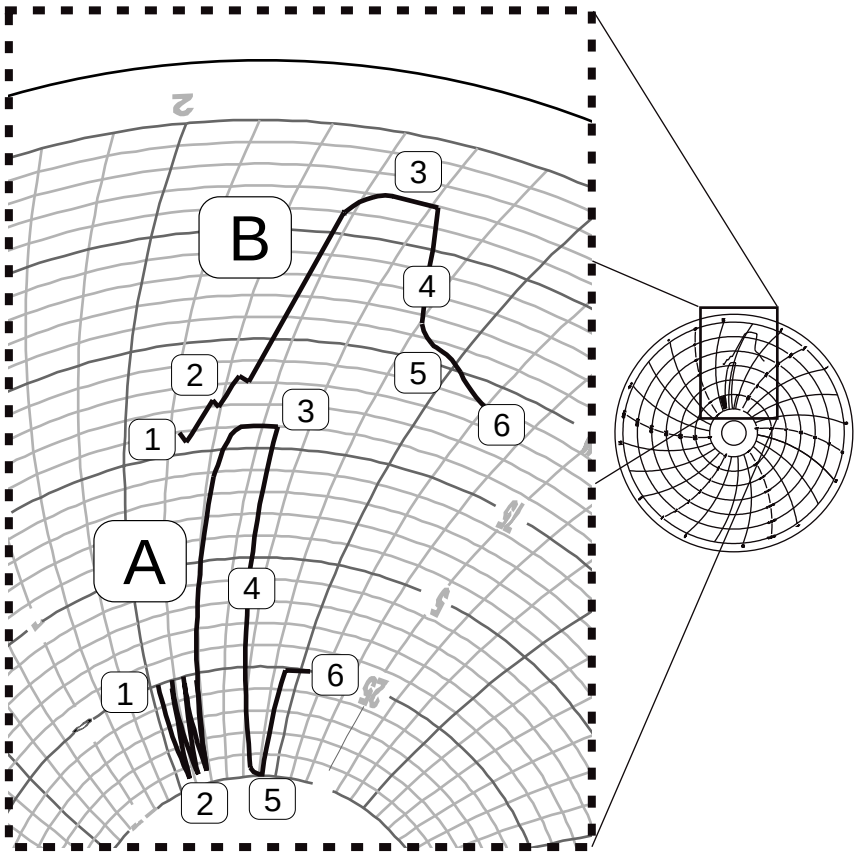
B Stabilization of chamber atmosphere 10 min.

C Check time 10 min.

D Pressure rise

Documentation of the process

A chart-type pressure and temperature gauge continuously records the pressure and temperature in the chamber on a circular chart. The edge of the chart is marked in hours.
The chart rotates once every 12 hours.



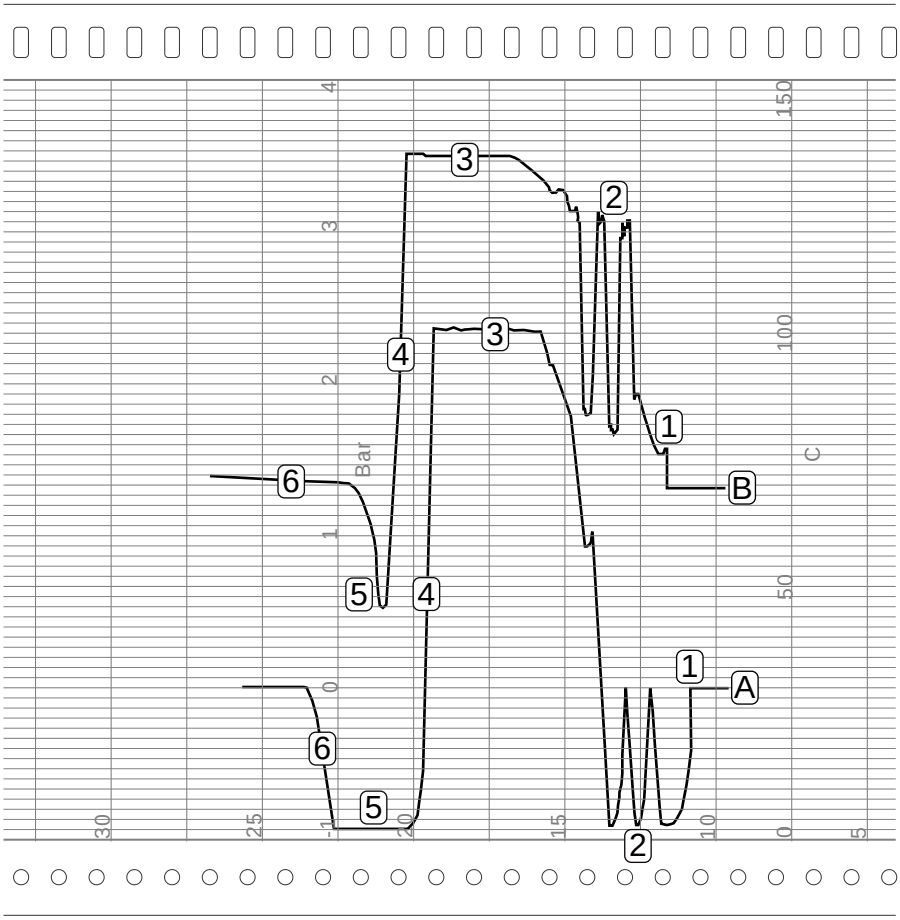
A	Pressure
B	Temperature
1	Start: The process is started by selecting a program and pressing the “Start” button. The pressure curve shows atmospheric pressure.
2	Pretreatment: The process begins with three vacuum applications down to about 90% vacuum, with steam admitted between each one. The vacuum applications can be seen as small deflections of the curve on the chart.

3	Sterilizing: When the sterilizing temperature is reached, the curves level out. The start of the sterilization time is indicated by a lamp lighting up on the control panel. The length of the sterilization time is determined by the set parameters.
4	Post-treatment: At the end of the sterilization time the vacuum pump starts and the pressure falls rapidly. The temperature curve falls quickly at first, then levels out.
5	Drying vacuum applied for the time that is determined by the set parameters.
6	Pressure equalisation: At the end of the drying vacuum time, air is admitted to the chamber through a sterile filter. When the chamber reaches atmospheric pressure, the door seal (which was pressed against the door by steam pressure during the process) is drawn in and the door can be opened.

Documentation of the process

The illustration below is schematic and should not be used as a model for evaluating individual process results.

A printing pressure and temperature recorder continuously records the pressure and temperature in the chamber on graph paper. The graph paper has scales for pressure and temperature.



A	Pressure
B	Temperature
1	Start: The process is started by pressing the "Start" button after a program has been selected. The pressure curve shows atmospheric pressure.

2 Pre-treatment:
The process begins with vacuum suction(s) down to approx. 90% vacuum with steam intake between each suction.

3 Disinfecting:
When the disinfecting temperature has been reached, the curves level out. The start of the disinfecting phase is indicated on the panel by a lamp lighting up. The length of the disinfecting time is determined according to the parameter settings.

4 Post-treatment:
After the disinfecting time has come to an end, the vacuum pump starts and the pressure decreases rapidly. The temperature curve at first falls rapidly and then levels out.

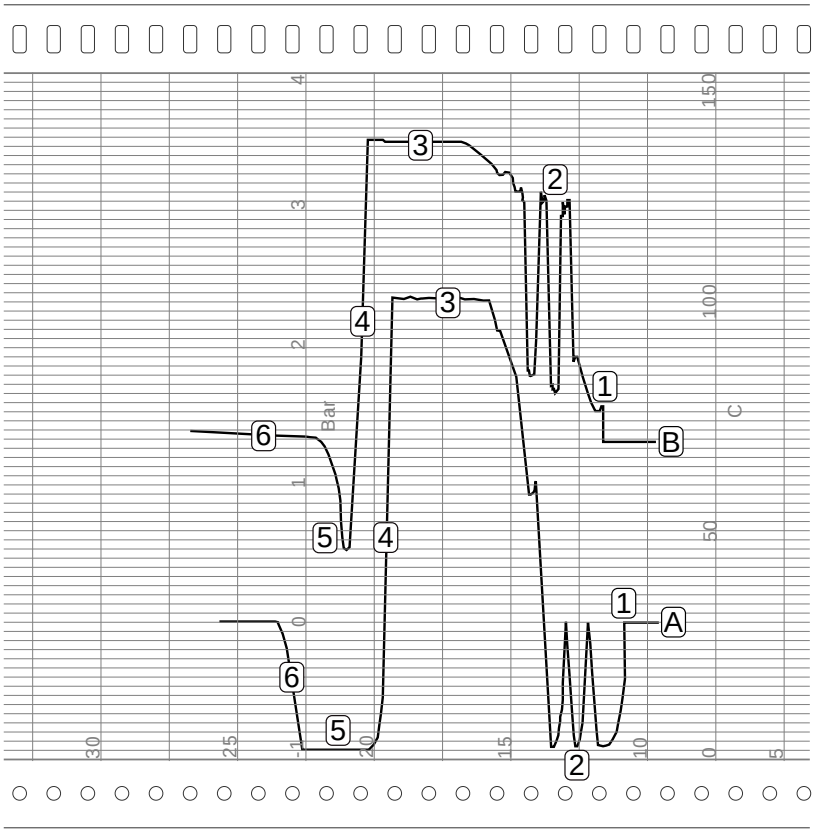
5 Drying vacuum is drawn during a period of time determined according to the parameter settings.

6 Pressure equalization:
When the drying-vacuum time has come to an end, air is released into the chamber through a sterile filter. When atmospheric pressure prevails in the chamber, the door gasket (which during the process has been pressed against the door with steam pressure) is drawn in and the door can be opened.

Documentation of the process

The picture below is schematic and is not to be used as a model for evaluating individual process results.

A chart-type pressure and temperature gauge continuously records the pressure and temperature in the chamber on a chart. The chart has scales for pressure and temperature.



A	Pressure
B	Temperature
1	Start: The process is started by selecting a program and pressing the “Start” button. The pressure curve shows atmospheric pressure.
2	Pretreatment: The process begins with three vacuum applications down to about 90% vacuum, with steam admitted between each one.

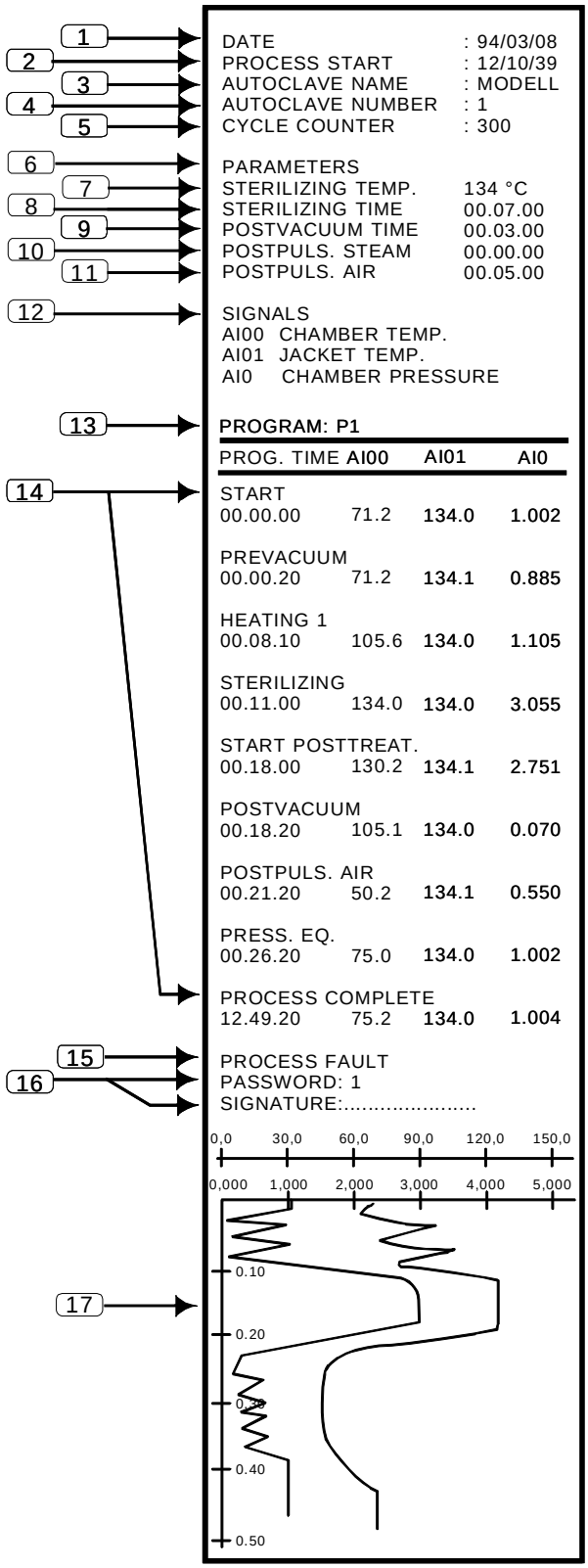
3	Sterilizing: When the sterilizing temperature is reached, the curves level out. The start of the sterilization time is indicated by a lamp lighting up on the control panel. The length of the sterilization time is determined by the set parameters.
4	Post-treatment: At the end of the sterilization time the vacuum pump starts and the pressure falls rapidly. The temperature curve falls quickly at first, then levels out.
5	Drying vacuum applied for the time that is determined by the set parameters.
6	Pressure equalisation: At the end of the drying vacuum time, air is admitted to the chamber through a sterile filter. When the chamber reaches atmospheric pressure, the door seal (which was pressed against the door by steam pressure during the process) is drawn in and the door can be opened.

Documentation of the process

The illustration below is schematic and should not be used as a model for evaluating individual process results.

PACS SUPERVISOR is a stand-alone measuring system which records the process data of the autoclave. When the supervisor is connected to a printer directly on the autoclave or via a stand-alone PC with Getinge's OPC or OPH program, a complete printout of recorded data is obtained. There are four different printout alternatives ('modes'), of which the one described is pre-set on delivery and is recommended by Getinge.
If printout or printer errors occur, the supervisor can save the mos recently run process for an 'emergency printout' which can be made later.
For further information, see the section on the supervisor in the SERVICE MANUAL section on CONTROL UNIT PACS 2000.

1	Date is indicated as day/ month/year. Year/month/day is used for Sweden.
2	Time when the autoclave was started. Indicated according to the 24-hour clock.
3	Type designation or name symbol of the autoclave.
4	Autoclave number, which is a number between 1 and 99 and is used in communication between more than one PACS 2000.
5	Cycle counter for up to 65,535 processes.
6	The parameters which can be modified with parameter codes are enumerated under the heading of PARAMETERS. In this example the parameters are disinfecting temperature (7) in °C and the times for various sub-processes (8-11) in hours, minutes and seconds.
12	The parameters selected for printout are enumerated under the heading of SIGNALS.
13	Designation for the program which has been started.
14	Process logging.
15	Printed out if an error has occurred during the process.
16	These lines are printed after a faulty process. As well as a code which indicates who has entered the authority code, there is a line for initials.
17	Graphic presentation of the process.

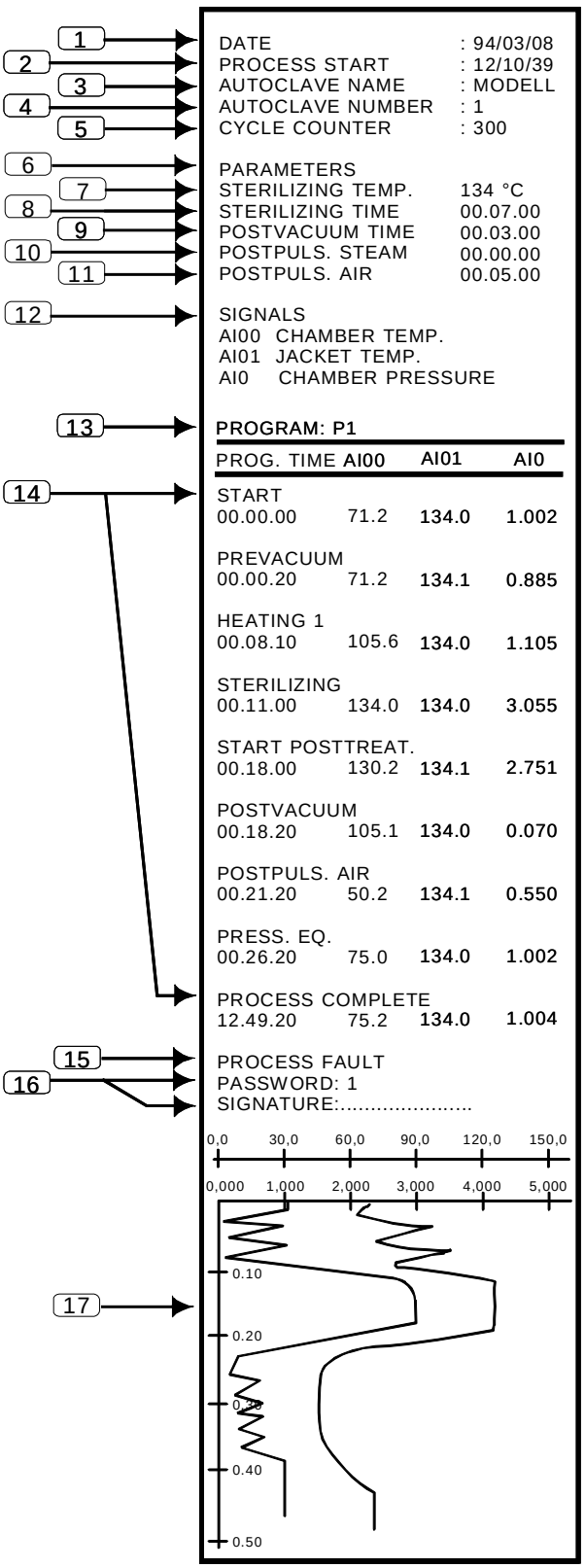


Documentation of the process

PACS SUPERVISOR is an independent measuring system that records the sterilizer's process data. If it is connected to a printer with the sterilizer, or via an independent PC running Getinge's OPC or OPH programs, a complete printout of the recorded data can be obtained. Four different modes of this printout are available, of which the one shown below is the default arrangement from delivery, and is recommended by Getinge. If a fault should occur during printout, or if the printer should fail, the Supervisor can store data for the most recent process, producing an emergency printout afterwards.
For more information, see the “Supervisor” section in the PACS 2000 CONTROL UNIT chapter of the SERVICE MANUAL.

The picture below is schematic and is not to be used as a model for evaluating individual process results.

1	Date in the format day/ month/year. (For Sweden, year/month/day)
2	Time sterilizer was started, using the 24-hour clock.
3	Sterilizer type designation or symbolic name
4	Sterilizer number, a number between 1 and 99 which is used during communication between several PACS 2000 units.
5	Cycle counter for up to 65,535 processes.
6	Listed under the heading PARAMETERS, the parameters in the current program that can be changed with a parameter code. In this example Sterilizing temperature (7) in °C and times for various (8-11) in hours, minutes and seconds.
12	Listed under the heading SIGNALS, the parameters chosen for printing.
13	Name of started program.
14	Process logging
15	Printed out if an error occurs during the process.
16	These lines are printed out after a faulty process. Code identification of the person who entered the password, and one line for initialling.
17	Graphic representation of the process



DAX018 . . . . . Manual filter sterilization

Air filter sterilization

The sterilizer is equipped with systems for manual sterilization of the air filter. Also a system for the wetting of the filter, prior to integrity testing, is provided.

Those systems, together with operating instructions, are described in the SERVICE MANUAL, chapter *Maintenance*.

DAX021 . . . . . Automatic filter sterilization

Air filter sterilization and test

The sterilizer is equipped with a program for automatic air-filter sterilization and in-line testing.

Note: Before starting the test program, make sure that the container for wetting liquid contains enough wetting liquid. Also check that the hoses for the wetting liquid container and the collecting vessel is firmly connected.

The type of wetting liquid to be used, is described in the SERVICE MANUAL.

The filter sterilization and test has its own program number (See list of programs).

The program includes 3 steps:

1. Sterilization: The filter is sterilized by passing steam through the filter and the filter housing. A temperature sensor in the drainpipe controls the temperature.
2. Wetting of filter cartridge: The wetting liquid fills up the filter housing. By using a special wetting liquid the pores in the filter membrane will be filled with liquid. When the filter housing is drained, required liquid will trapped in the filter.
3. Test: After the wetting phase the upstream side of the filter cartridge will be pressure tested by compressed air. It can be determined whether the filter is OK or not by measuring the leakage of air through the filter cartridge. A failed test will result in an alarm.

Sterilization and testing of the air filter

The sterilizer has a program for sterilizing and testing the air filter.

NOTE: The temperature in the service room and of the water used for the test should be between 20 oC and 30 oC for a reliable test.

Filter sterilizing and testing has its own program number (see THE PROGRAM COMBINATION).

The program has the following stages:

1. Sterilizing: The filter is sterilized by steam flowing through the filter and the filter housing. The temperature is controlled by means of a temperature sensor located in the outlet.
2. Filling filter housing with water: The space in the filter housing, upstream of the filter cartridge, is filled with water and the trapped air is placed under pressure. This pressure is held for a stabilizing period.
3. Test: When it has been filled with water, the filter is pressure-tested by the compressed air influencing the pressure on the water upstream of the filter. By measuring the pressure drop across the filter cartridge and the water flow rate through it, it is possible to determine whether the filter is serviceable or not. If the test is negative, an alarm is given.
4. When the alarm has been acknowledged, the operator can choose to continue the process (press start/restart) or to rerun the test (press P1/test).
5. Draining and drying: The filter housing is dried and drained by blowing compressed air blown through the filter cartridge.

Sterilization and testing of the air filter

The sterilizer has a program for automatic sterilizing and manual testing of the air filter.

NOTE: The temperature in the service room and of the water used for the test should be between 20 °C and 30 °C for a reliable test.

Filter sterilizing and testing has its own program number (see THE PROGRAM COMBINATION).

The program has the following stages:

The water tank must be filled with water before the program is started.

1. Sterilizing: The filter is sterilized by steam flowing through the filter and the filter housing. The temperature is controlled by means of a temperature sensor located in the outlet.
2. Cooling: The filter housing is cooled with compressed air.
3. Filling filter housing with water: The space in the filter housing, upstream of the filter cartridge, is filled with water and the valves are set to the filter test position.
4. Test: The control system display reads “Filter test”. The operator must now connect the test equipment and conduct the test. When the test is complete, the operator removes the equipment and lets the program continue to run by pressing the start button.
5. Draining and drying: The filter housing is dried and drained by blowing comp ressed air blown through the filter cartridge.

Air filter sterilization

The sterilizer is equipped with a program for automatic air-filter sterilization.

The filter sterilization has its own program number (See list of programs).

The filter is sterilized by passing steam through the filter and the filter housing. A temperature sensor in the drainpipe controls the temperature.

After sterilization the system is gently cooled by a restricted airflow through the filter.

DAX032 . . . . . Automatic filter sterilization and test, devided.

Air filter sterilization and test

The sterilizer is equipped with one program for automatic air-filter sterilization and a separate program for in-line testing.

The filter sterilization and test has its own program numbers (See list of programs).

As the test is to be made at a temperature below 30°C, it is for some installations recommended to run the sterilization in the evening and the test in the morning the following day.

Sterilization:
The filter is sterilized by passing steam through the filter and the filter housing. A temperature sensor in the drainpipe controls the temperature. After the sterilization the filter is cooled below 60°C.

Test:
The testprogram is divided in three parts.

Note: Before starting the test program, make sure that the container for wetting liquid contains enough wetting liquid. Also check that the hoses for the wetting liquid container and the collecting vessel is firmly connected.

The type of wetting liquid to be used, is described in the SERVICE MANUAL.

1. **Cooling:** The cartridge is cooled, by air, to a temperature below 30°C.
2. Wetting of filter cartridge: The wetting liquid fills up the filter housing. By using a special wetting liquid the pores in the filter membrane will be filled with liquid. When the filter housing is drained, required liquid will trapped in the filter.
3. Test: After the wetting phase the upstream side of the filter cartridge will be pressure tested by compressed air. It can be determined whether the filter is OK or not by measuring the leakage of air through the filter cartridge. A failed test will result in an alarm.

DAX031 . . . . . Automatic leakage test of heat exchanger, GEV

Automatic leakage test of heat exchanger

The sterilizer has systems and programs for automatic leakage testing of the heat exchangers mounted in the chamber.

This program has its own program number, which can be seen from the program combination.

The program is based on the fact that the pressure in the heat exchanger must be higher than the ambient pressure and higher than the pressure of incoming water and steam. This is in order to ensure that, for example, a leaking valve does not give a false ready signal.

The program has two major parts:

1. Flushing
   The heat exchanger is flushed with cooling water for a certain time. This is done to remove any air residue from the system. The inlet and outlet valves are then closed.
2. Testing
   The chamber is heated at 2 degC/min. This raises the temperature of the water in the heat exchange. The water expands and raises the pressure in the heat exchanger. When the pressure exceeds 8 bar, a pressure switch sends a signal to the control system. The temperature in the chamber is then kept constant for a further five minutes. If the pressure switch has not given a signal when the chamber temperature breaches 50 °C, or if the pressure switch operates during the five-minute constant temperature period, it is assumed that a leak has been detected. An alarm is given.

NOTE: A leaking valve or leaking coupling outside the sterilizer chamber may cause an alarm.

DAX022 . . . . . Man filter sterilization

Air filter sterilization

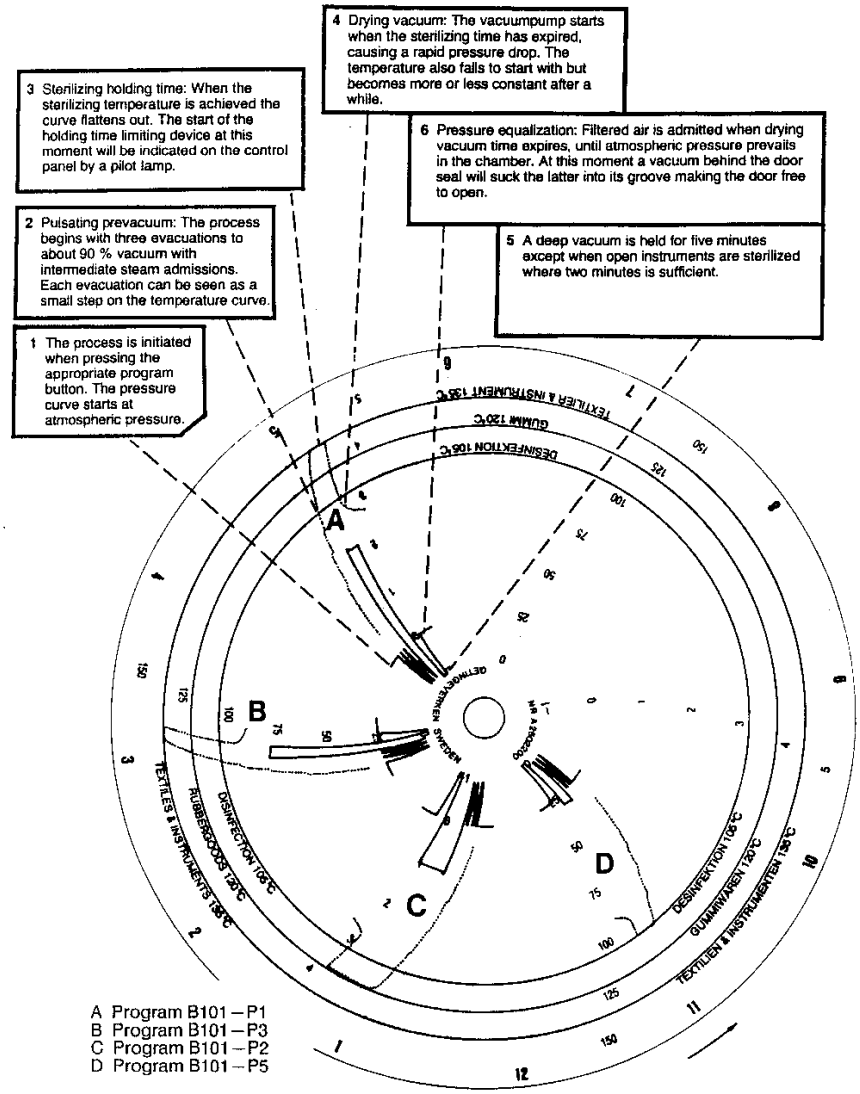
The sterilizer is equipped with a system for manual air-filter sterilization. This system, together with operating instructions, is described in the SERVICE MANUAL, chapter Maintenance.

DAX020 . . . . . Kihlström circular chart pen recorder

Documentation of the process

A combined instrument, built up either as circular chart pen recorder or alternatively a multi point paper roll recorder registers the chamber process temperature and pressure.

The figure below shows how four different processes may look with a circular chart recorder.


4 Drying vacuum: The vacuumpump starts when the sterilizing time has expired, causing a rapid pressure drop. The temperature also falls to start with but becomes more or less constant after a while.
3 Sterilizing holding time: When the sterilizing temperature is achieved the curve flattens out. The start of the holding time limiting device at this moment will be indicated on the control panel by a pilot lamp.
6 Pressure equalization: Filtered air is admitted when drying vacuum time expires, until atmospheric pressure prevails in the chamber. At this moment a vacuum behind the door seal will suck the latter into its groove making the door free to open.
2 Pulsating prevacuum: The process begins with three evacuations to about 90 % vacuum with intermediate steam admissions. Each evacuation can be seen as a small step on the temperature curve.
5 A deep vacuum is held for five minutes except when open instruments are sterilized where two minutes is sufficient.
1 The process is initiated when pressing the appropriate program button. The pressure curve starts at atmospheric pressure.
A
B
C
D
TEXTILES & INSTRUMENTS 135°C
RUBBERGOODS 120°C
DISINFECTION 105°C
GETINGE STERILIZER
MADE IN SWEDEN

A Program B101 – P1
B Program B101 – P3
C Program B101 – P2
D Program B101 – P5

INSTRUMENTS AND CONTROLS

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1. Recorder for temperature and pressure.
2. Operating panel OP 2.
3. Steam supply pressure gauge.
4. Chamber pressure gauge.
5. Emergency stop.
6. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

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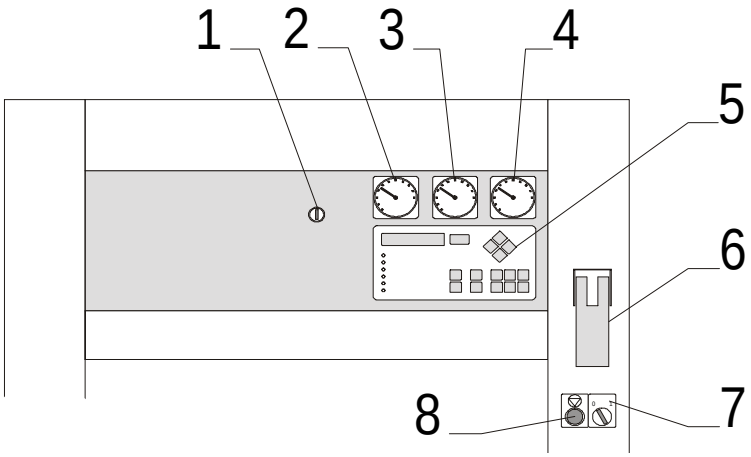

1. Door blocking key. (Some models).
2. Steam supply pressure gauge.
3. Chamber pressure gauge.
4. Jacket pressure gauge.
5. Operating panel OP 2.
6. Formaldehyd bottle holder and locker.
7. Control voltage switch.
8. Emergency stop.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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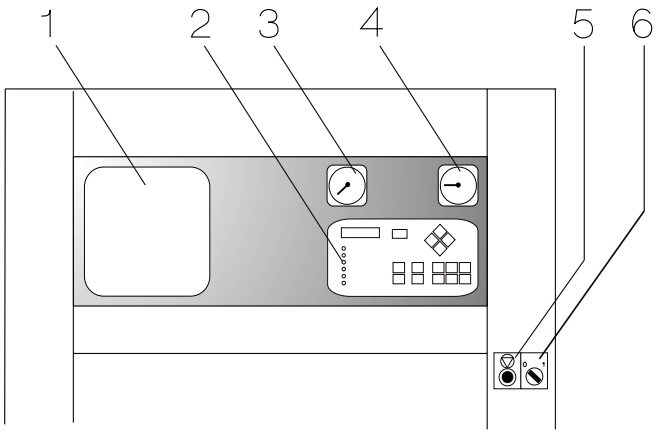

1. Recorder for temperature and pressure.
2. Operating panel OP 2.
3. Steam supply pressure gauge.
4. Chamber pressure gauge.
5. Emergency stop.
6. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

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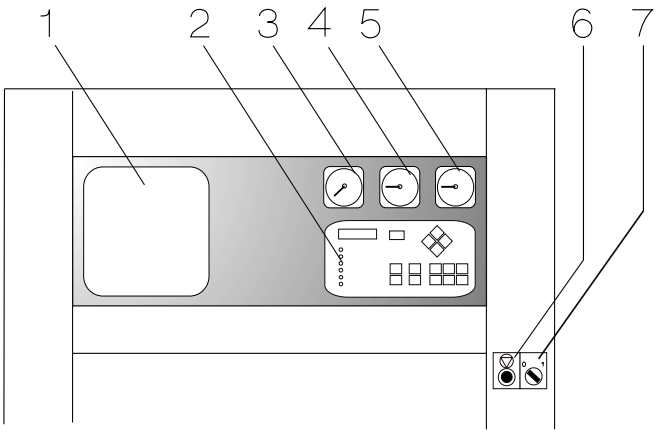

1. Recorder for temperature and pressure.
2. Operating panel OP 2.
3. Steam supply pressure gauge.
4. Chamber pressure gauge.
5. Jacket pressure gauge.
6. Emergency stop.
7. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

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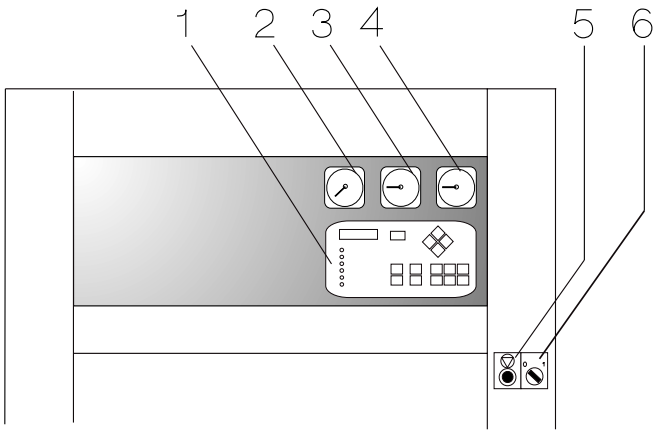

1. Operating panel OP 2.
2. Steam supply pressure gauge.
3. Chamber pressure gauge.
4. Jacket pressure gauge.
5. Emergency stop.
6. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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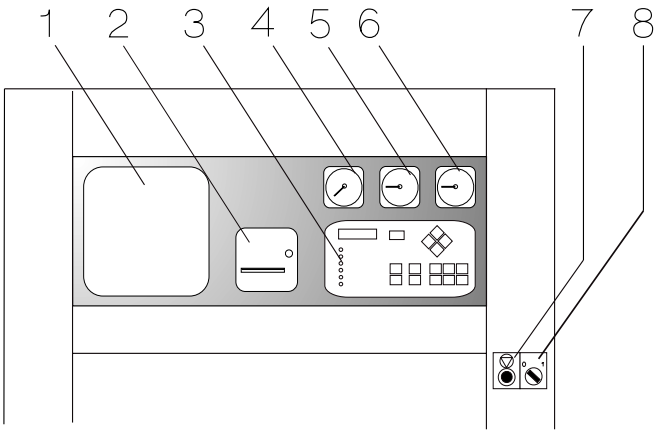

1. Recorder for temperature and pressure.
2. Printer for temperature and pressure.
3. Operating panel OP 2.
4. Steam supply pressure gauge.
5. Chamber pressure gauge.
6. Jacket pressure gauge.
7. Emergency stop.
8. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Printer

Follow instructions in the SERVICE MANUAL.

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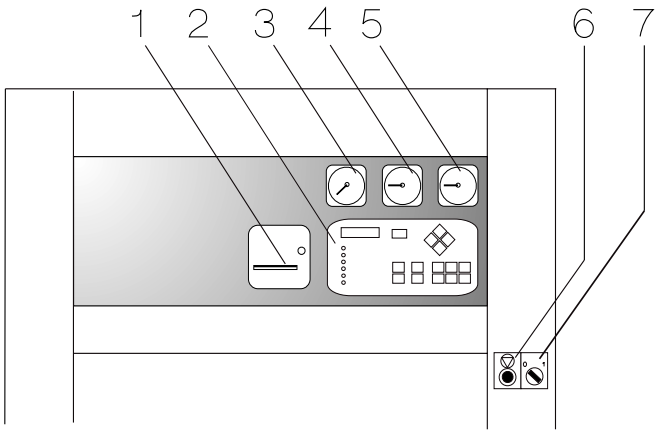

1. Printer for temperature and pressure.
2. Operating panel OP 2.
3. Steam supply pressure gauge.
4. Chamber pressure gauge.
5. Jacket pressure gauge.
6. Emergency stop.
7. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Printer

Follow instructions in the SERVICE MANUAL.

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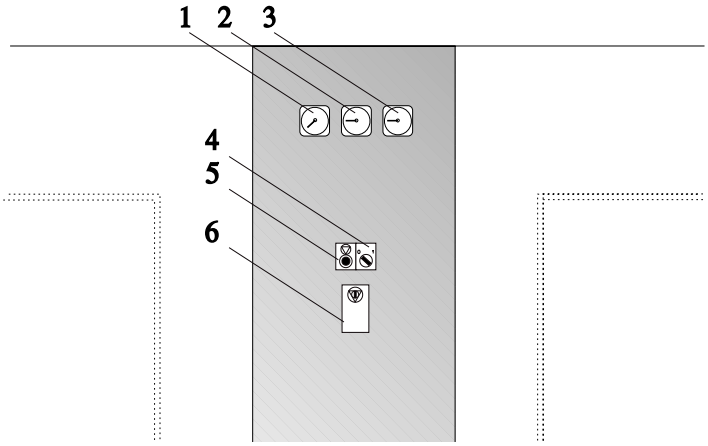

1. Steam supply pressure gauge.
2. Chamber pressure gauge.
3. Jacket pressure gauge.
4. Control voltage switch.
5. Emergency stop.
6. Door blockage key.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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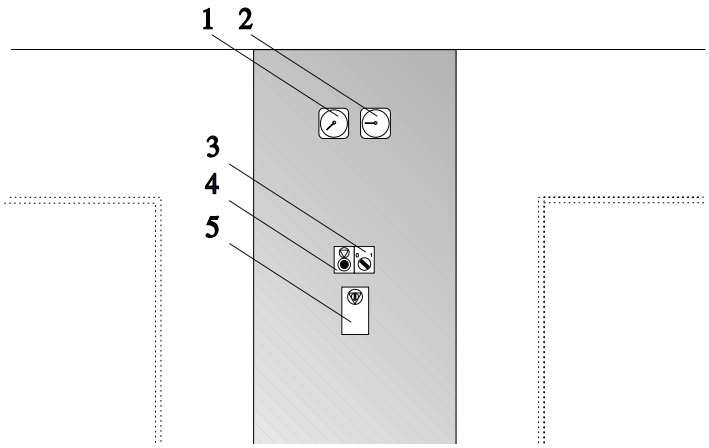

1. Steam supply pressure gauge.
2. Chamber pressure gauge.
3. Control voltage switch.
4. Emergency stop.
5. Door blocking key.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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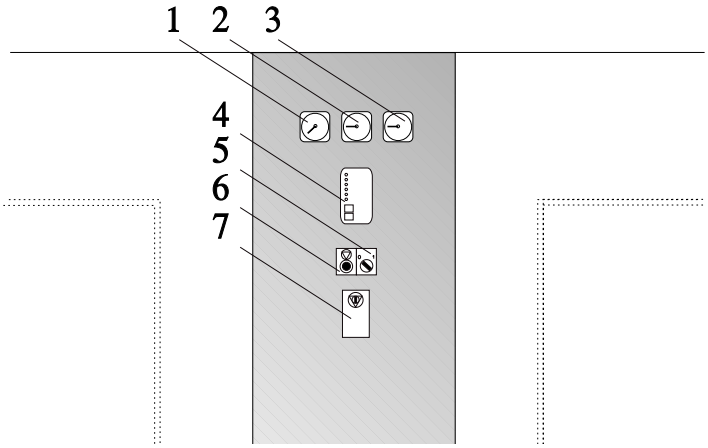

1. Steam supply gauge.
2. Chamber pressure gauge.
3. Jacket pressure gauge.
4. Operatörspanel OP 1
5. Control voltage switch.
6. Emergency stop.
7. Door blocking key.

Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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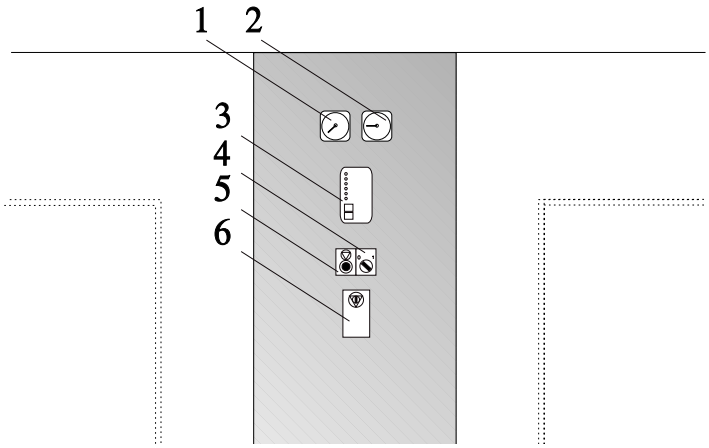

1. Steam supply pressure gauge.
2. Chamber pressure gauge.
3. Operator panel OP 1.
4. Control voltage switch.
5. Emergency stop.
6. Door blocking key.

Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7..

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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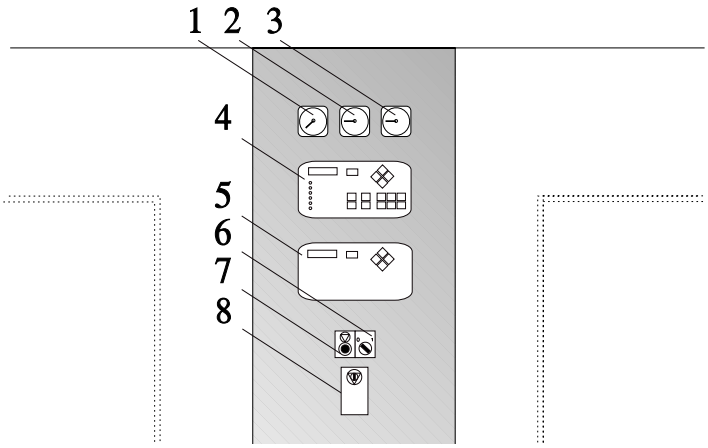

1. Steam supply pressure gauge.
2. Chamber pressure gauge.
3. Jacket pressure gauge.
4. Operating panel OP 2.
5. Supervisor.
6. Control voltage switch.
7. Emergency stop.
8. Door blocking key.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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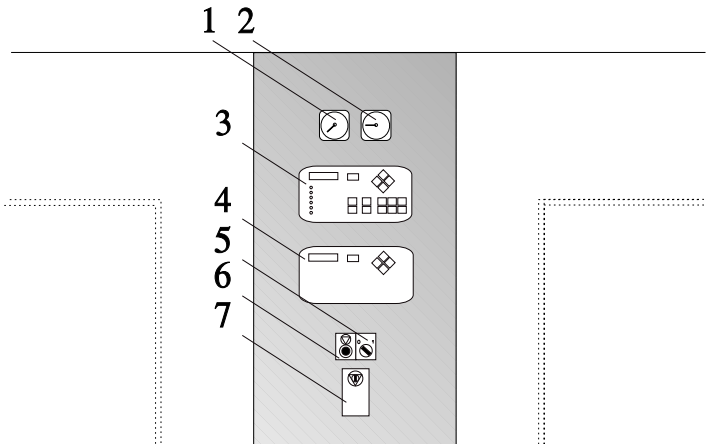

1. Steam supply gauge.
2. Chamber pressure gauge.
3. Operator panel OP 2.
4. Supervisor.
5. Control voltage switch.
6. Emergency stop.
7. Door blocking key.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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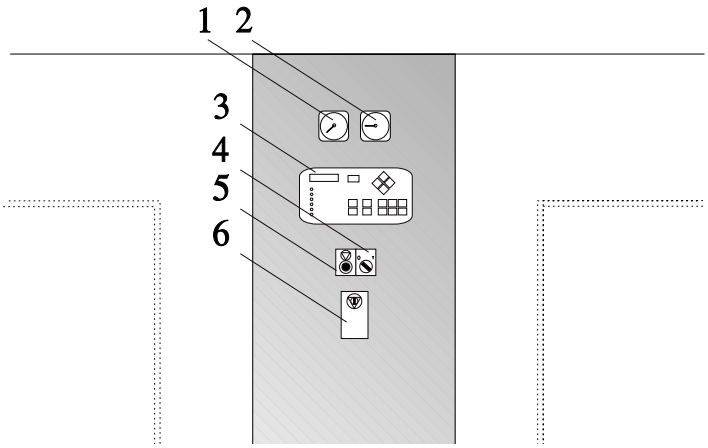

1. Steam supply gauge.
2. Chamber pressure gauge.
3. Operator panel OP 2.
4. Control voltage switch.
5. Emergency stop.
6. Door blocking key.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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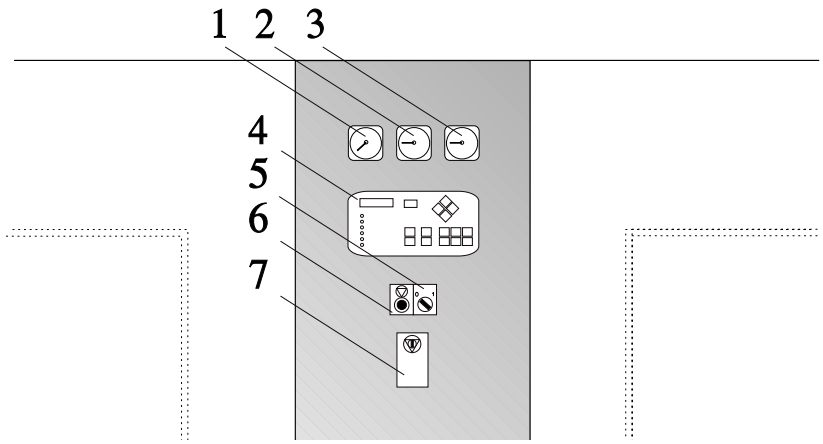

1. Steam supply gauge.
2. Chamber pressure gauge.
3. Jacket pressure gauge.
4. Operator panel OP 2.
5. Control voltage switch.
6. Emergency stop.
7. Door blocking key.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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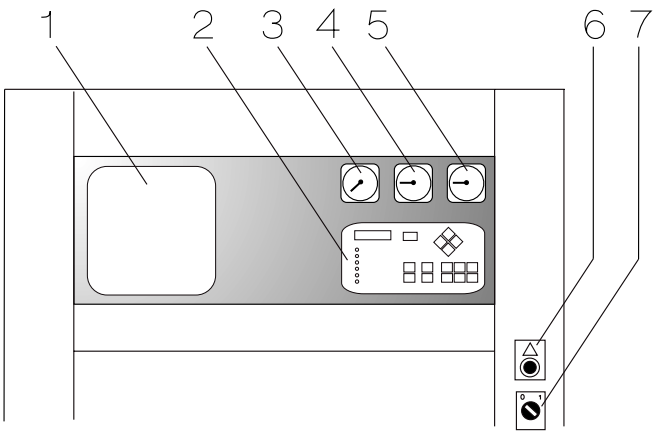

1. Recorder for temperature and pressure.
2. Operator panel OP 2.
3. Steam supply gauge.
4. Chamber pressure gauge.
5. Jacket pressure gauge.
6. Emergency stop
7. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

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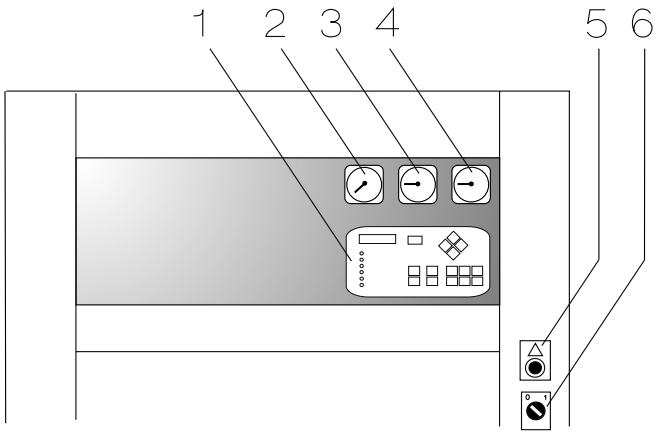

1. Operator panel OP 2.
2. Steam supply gauge.
3. Chamber pressure gauge.
4. Jacket pressure gauge.
5. Emergency stop
6. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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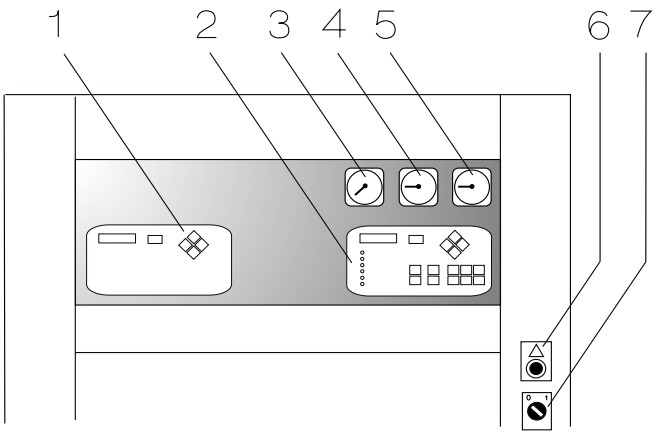

1. Operator panel Supervisor.
2. Operator panel OP 2.
3. Steam supply gauge.
4. Chamber pressure gauge.
5. Jacket pressure gauge.
6. Emergency stop.
7. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Supervisor.

Get acquainted with the unit by studying the SUPERVISOR manual in chapter 8.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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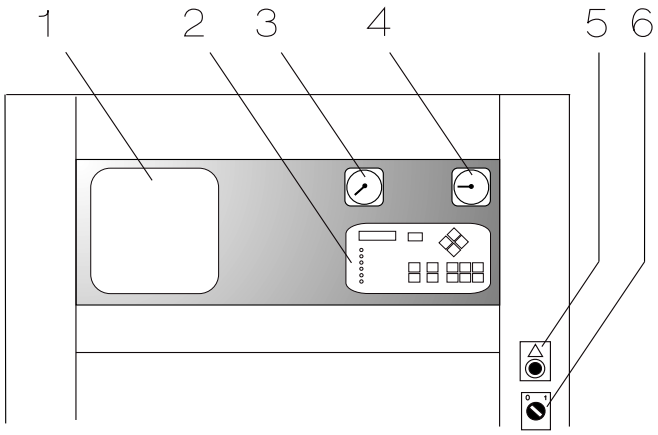

1. Recorder for temperature and pressure.
2. Operator panel OP 2.
3. Steam supply gauge.
4. Chamber pressure gauge.
5. Emergency stop.
6. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

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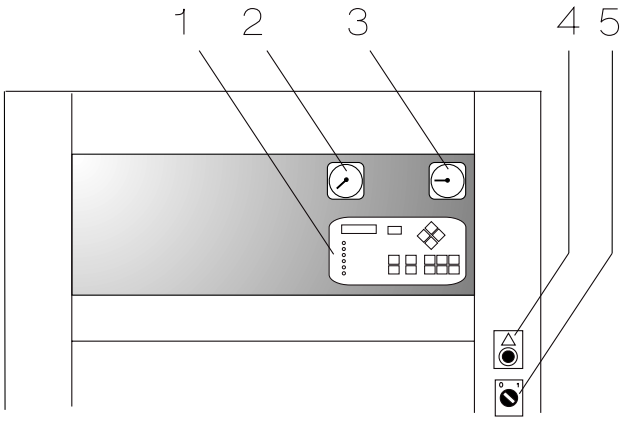

1. Operator panel OP 2.
2. Steam supply gauge.
3. Chamber pressure gauge.
4. Emergency stop.
5. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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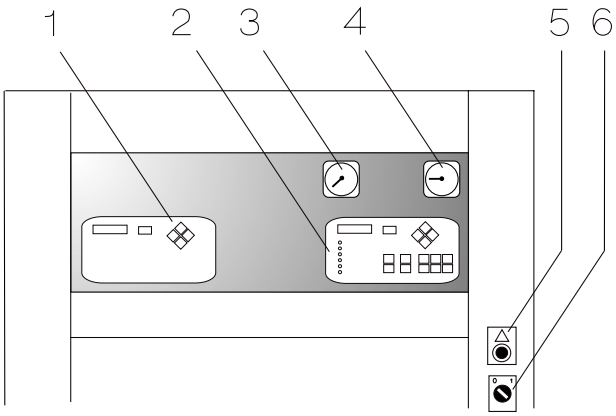

1. Control panel Supervisor.
2. Operator panel OP 2.
3. Steam supply gauge.
4. Chamber pressure gauge.
5. Emergency stop.
   Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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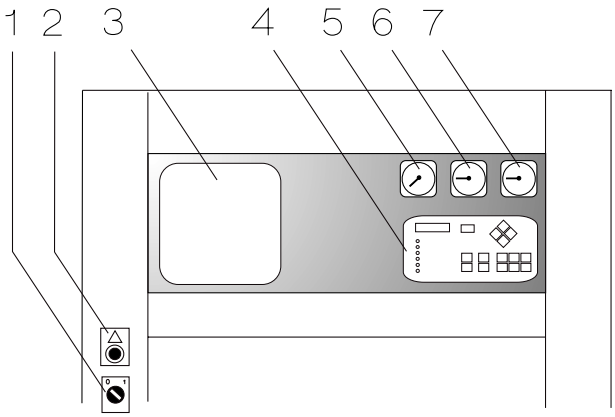

1. Control voltage switch.
2. Emergency stop.
3. Recorder for temperature and pressure.
4. Operator panel OP 2.
5. Steam supply gauge.
6. Chamber pressure gauge.
7. Jacket pressure gauge.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

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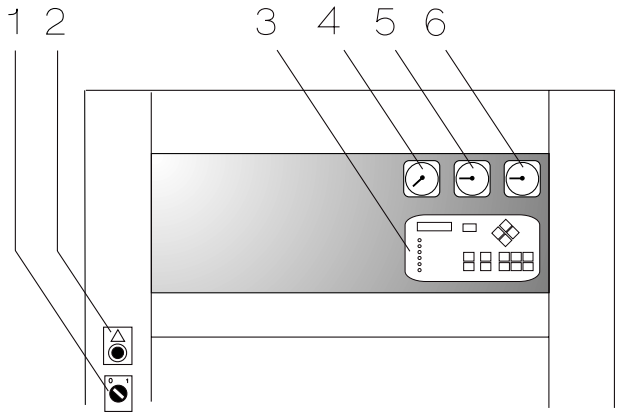

1. Control voltage switch.
2. Emergency stop.
3. Operator panel OP 2.
4. Steam supply gauge.
5. Chamber pressure gauge.
6. Jacket pressure gauge.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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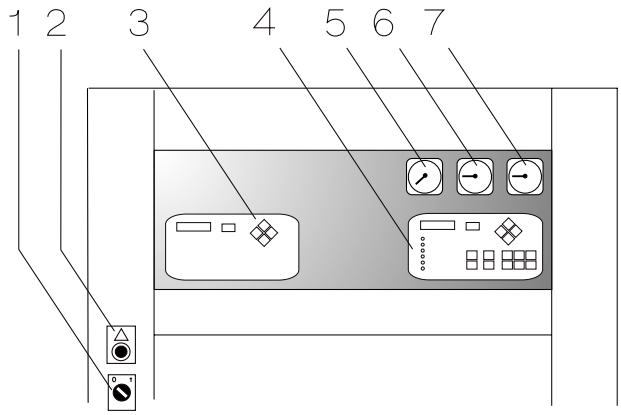

1. Control voltage switch.
2. Emergency stop.
3. Control panel Supervisor.
4. Operator panel OP 2.
5. Steam supply gauge.
6. Chamber pressure gauge.
7. Jacket pressure gauge.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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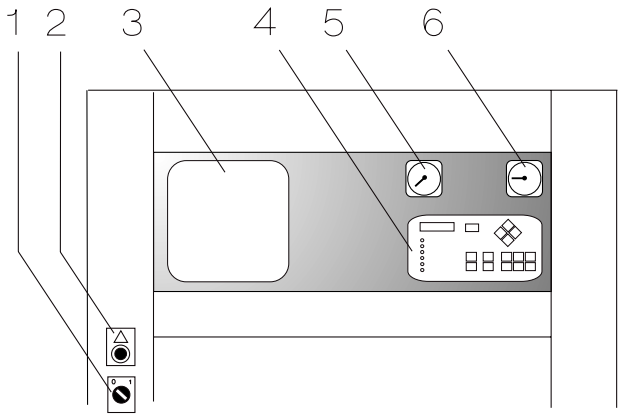

1. Control voltage switch.
2. Emergency stop.
3. Recorder for temperature and pressure.
4. Operator panel OP 2.
5. Steam supply gauge.
6. Chamber pressure gauge.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

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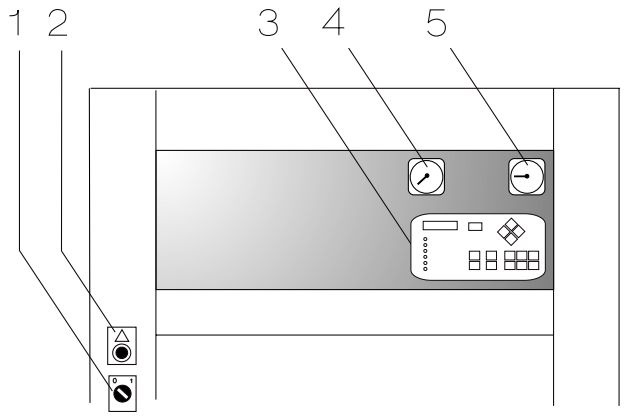

1. Control voltage switch.
2. Emergency stop.
3. Operator panel OP 2.
4. Steam supply gauge.
5. Chamber pressure gauge.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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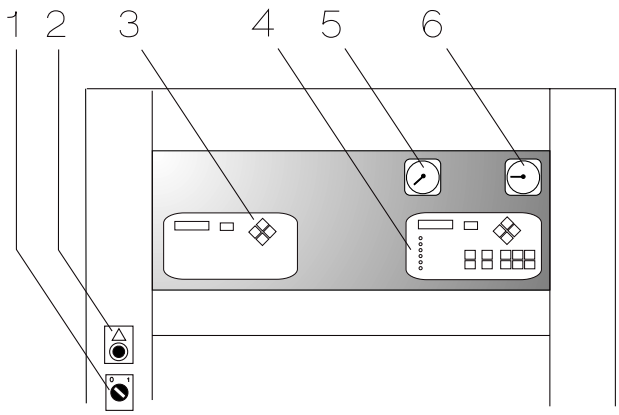

1. Control voltage switch.
2. Emergency stop.
3. Control panel Supervisor.
4. Operator panel OP 2.
5. Steam supply gauge.
6. Chamber pressure gauge.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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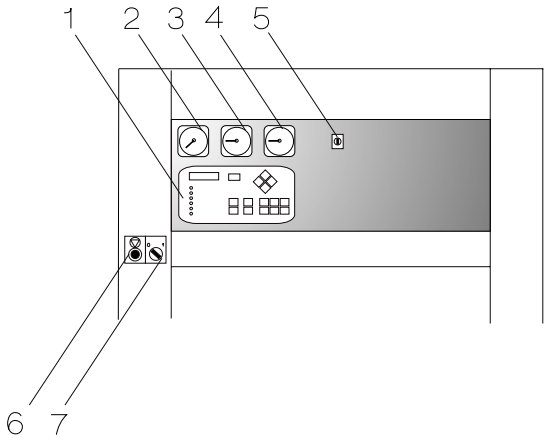

1. Operating panel OP 2.
2. Steam supply pressure gauge.
3. Chamber pressure gauge.
4. Jacket pressure gauge.
5. Door blocking key. (Some models).
6. Emergency stop.
7. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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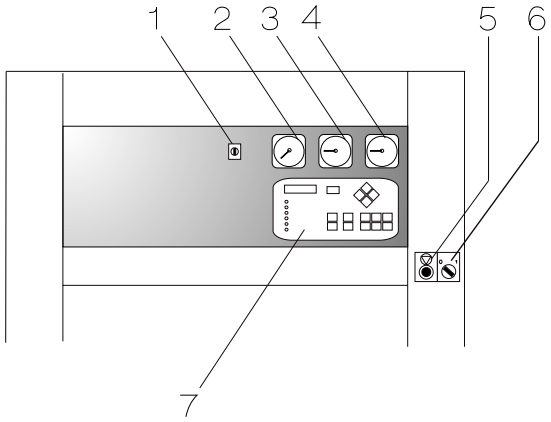

1. Door blocking key. (Some models).
2. Steam supply pressure gauge.
3. Chamber pressure gauge.
4. Jacket pressure gauge.
5. Emergency stop.
6. Control voltage switch.
7. Operating panel OP 2.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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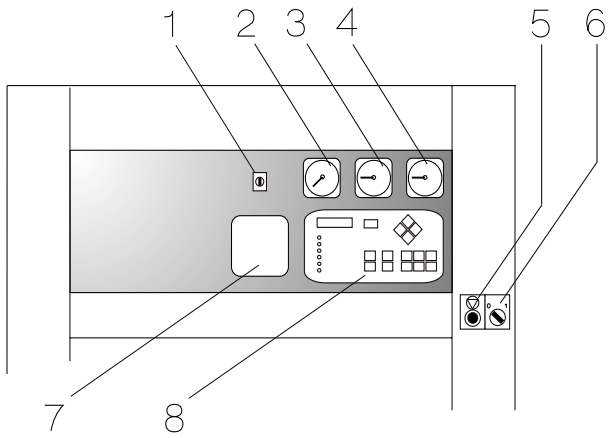

1.	Door interlock key.	5.	Emergency stop.
2.	Steam supply pressure gauge.	6.	Control voltage switch.
3.	Chamber pressure gauge.	7.	Printer for temperature and pressure.
4.	Jacket pressure gauge.	8.	Operating panel OP 2.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door interlock key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

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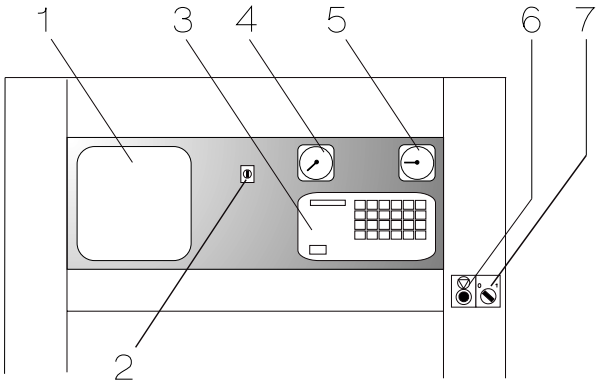


1. Recorder for temperature and pressure.
2. Doorblocking key. (Some models).
3. Operating panel OP 2.
4. Steam supply pressure gauge.
5. Chamber pressure gauge.
6. Emergency stop.
7. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

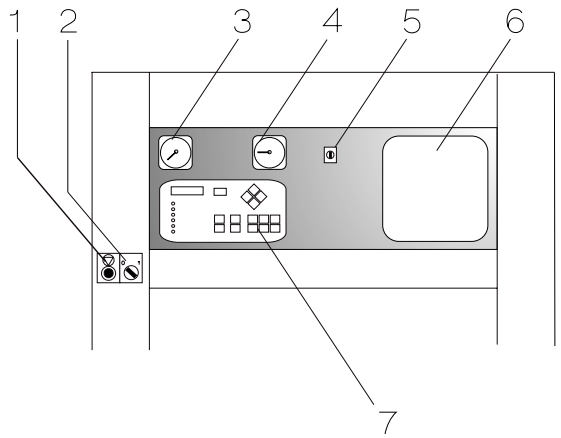
Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Loading side



1. Emergency stop.
2. Control voltage switch.
3. Steam supply pressure gauge.
4. Chamber pressure gauge.
5. Door blocking key. (Some models).
6. Recorder for temperature and pressure.
7. Operating panel OP 2.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

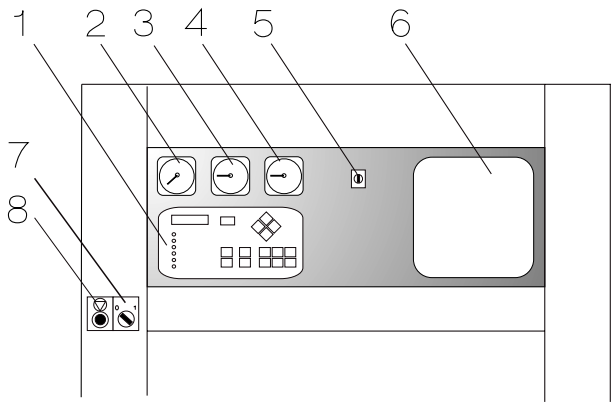
Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Loading side



1.	Operating panel OP 2.	5.	Door blocking key. (Some models).
2.	Steam supply pressure gauge.	6.	Recorder for temperature and pressure.
3.	Chamber pressure gauge.	7.	Control voltage switch.
4.	Jacket pressure gauge.	8.	Emergency stop.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

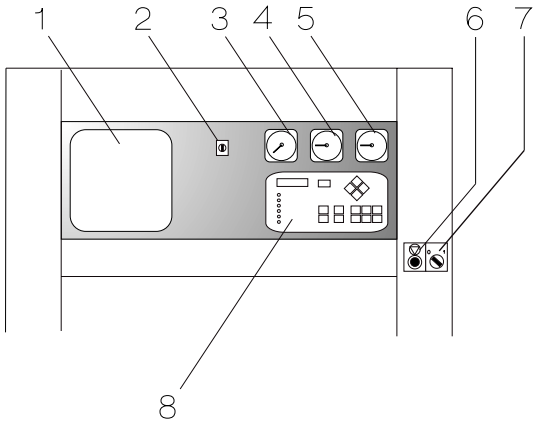
Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Loading side



1. Recorder for temperature and pressure.
2. Doorblocking key. (Some models).
3. Steam supply pressure gauge.
4. Chamber pressure gauge.
5. Jacket pressure gauge.
6. Emergency stop.
7. Control voltage switch.
8. Operating panel OP 2.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

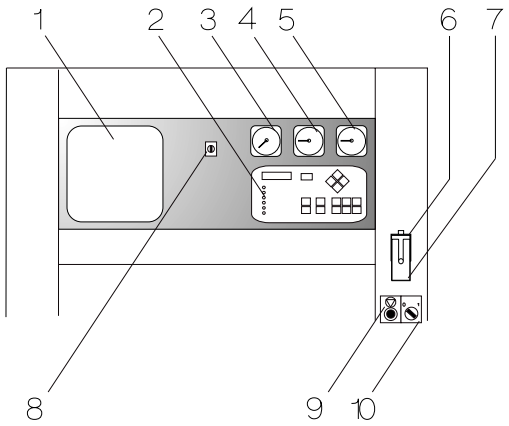
Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Loading side



1. Recorder for temperature and pressure.
2. Operating panel OP 2.
3. Steam supply pressure gauge.
4. Chamber pressure gauge.
5. Jacket pressure gauge.
6. Formaldehyd bottle locker.
7. Formaldehyd bottle holder.
8. Doorblocking key. (Some models).
9. Emergency stop.
10. Control voltage switch.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

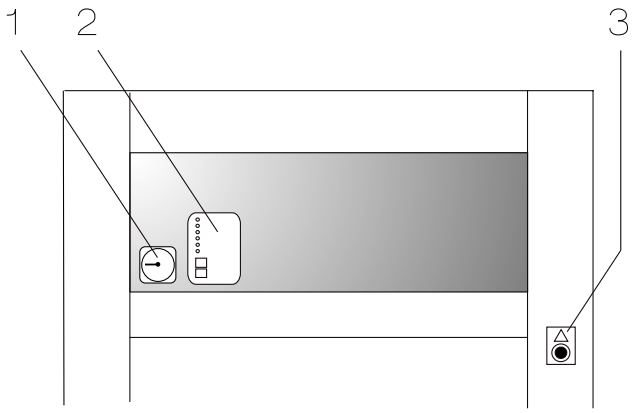
Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Unloading side



1. Chamber pressure gauge.
2. Operator panel OP 1.
3. Control voltage switch.

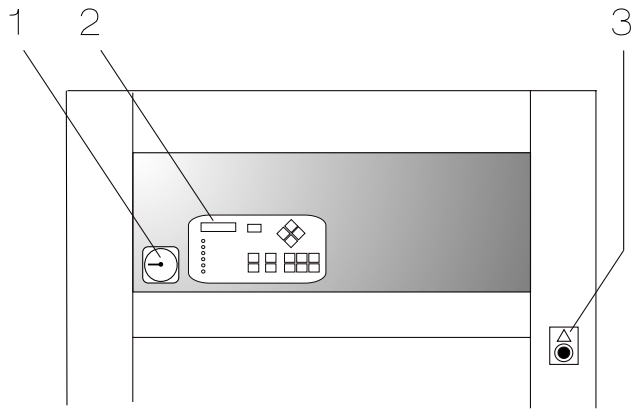
Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unloading side



1. Chamber pressure gauge.
2. Operator panel OP 2.
3. Control voltage switch.

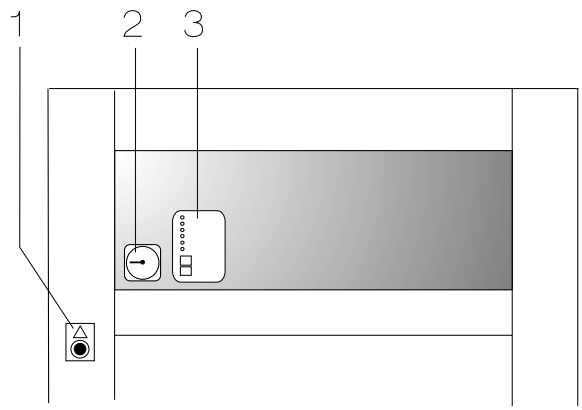
Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unloading side



1. Control voltage switch.
2. Chamber pressure gauge.
3. Operator panel OP 1.

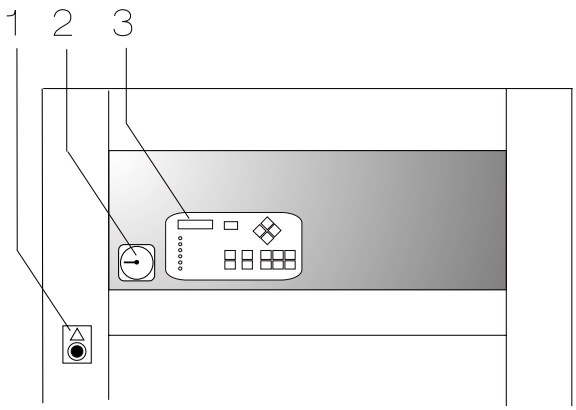
Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unloading side



1. Control voltage switch.
2. Chamber pressure gauge.
3. Operator panel OP 2.

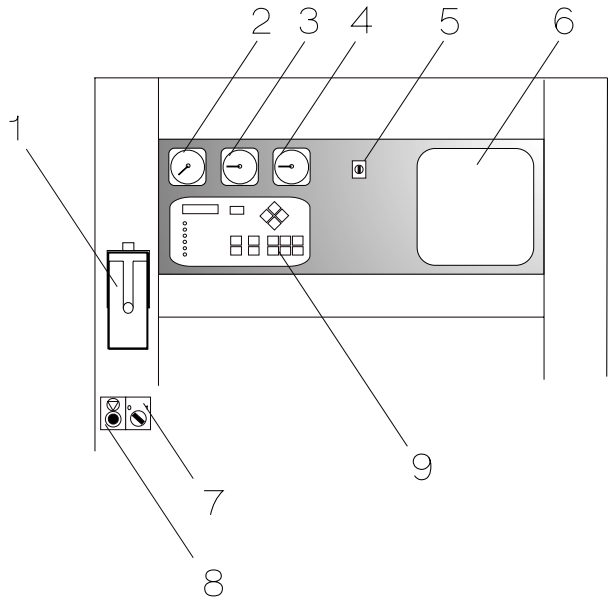
Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unoading side



1.	Formaldehyd bottle holder.	6.	Recorder for temperature and pressure.
2.	Steam supply pressure gauge.	7.	Control voltage switch.
3.	Chamber pressure gauge.	8.	Emergency stop.
4.	Jacket pressure gauge.	9.	Operating panel OP 2.
5.	Doorblocking key. (Some models).	10.	

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

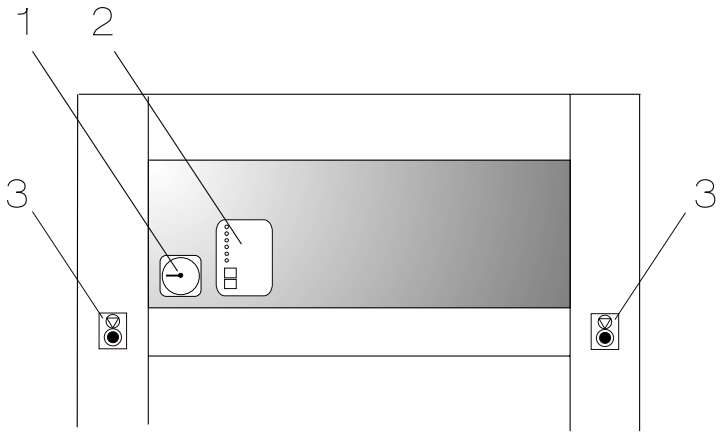
Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Unloading side



1. Emergency stop. (Left or right side).
2. Chamber pressure gauge.
3. Operator panel OP 1.

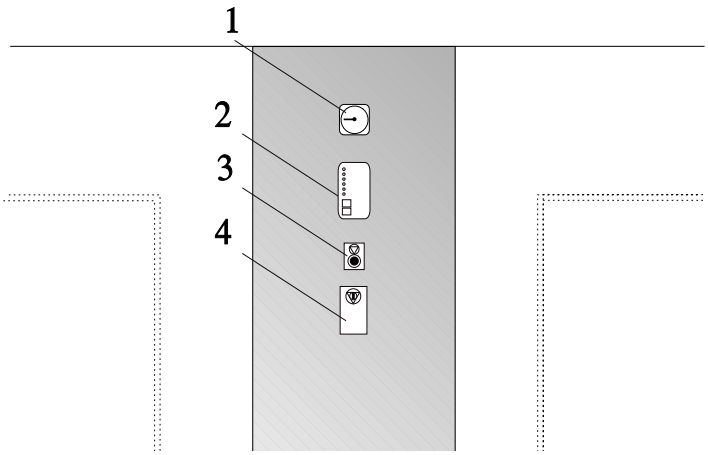
Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unloading side



1. Chamber pressure gauge.
2. Operator panelOP 1.
3. Emergency stop.
4. Door blocking key.

Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

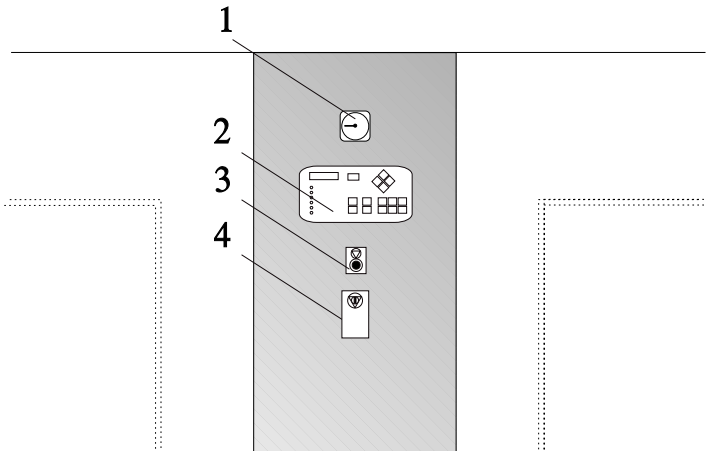
Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unloading side



1. Chamber pressure gauge.
2. Operator panel OP 2.
3. Emergency stop.
   Door blocking key.

Operator panel OP 2

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

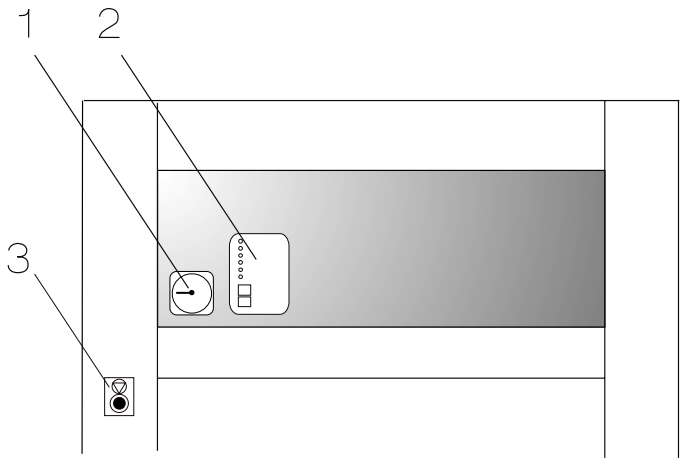
Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Door blocking key

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unloading side



1. Emergency stop.
2. Chamber pressure gauge.
3. Operator panel OP 1.

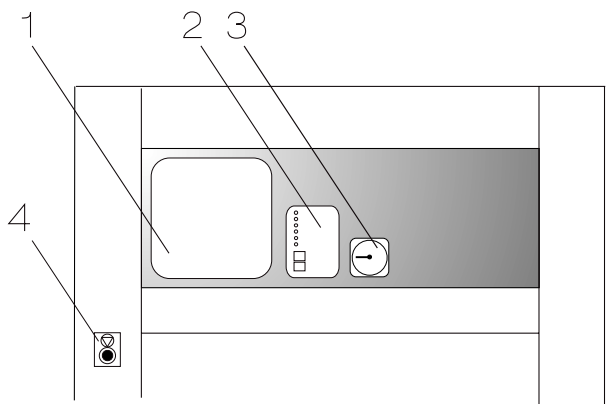
Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unloading side



1. Recorder for temperature and pressure.
2. Operator panel OP 1.
3. Chamber pressure gauge.
   Emergency stop.

Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

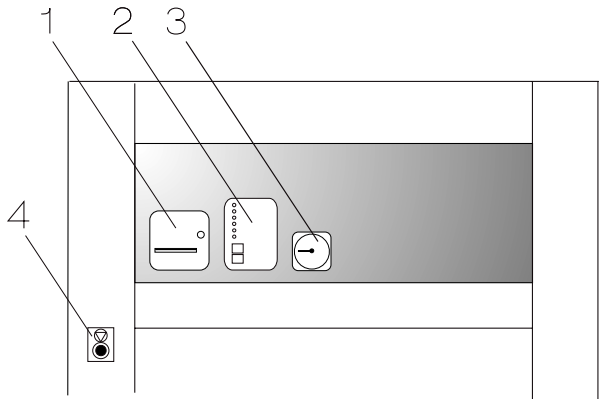
Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Unloading side



1. Printer for temperature and pressure.
2. Operator panel OP 1.
3. Chamber pressure gauge.
4. Emergency stop.

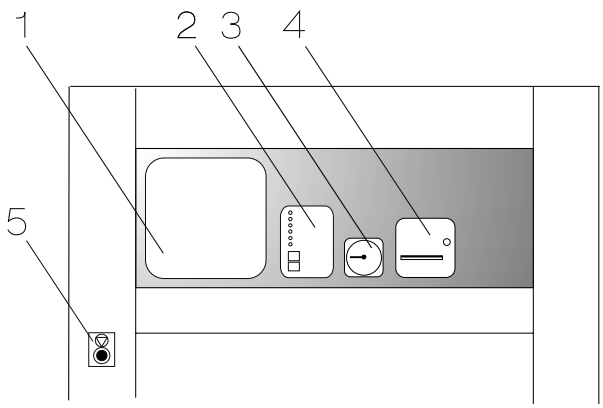
Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Unloading side



1. Recorder for temperature and pressure.
2. Operator panel OP 1.
3. Chamber pressure gauge.
4. Printer for temperature and pressure.
5. Emergency stop.

Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Printer

Follow instructions in the SERVICE MANUAL.

Unloading side

FAV047

1. Recorder for temperature and pressure.
2. Operator panel OP 1.
3. Chamber pressure gauge.
4. Printer for temperature and pressure.
5. Emergency stop.

Operator panel OP 1

Get acquainted with the function of the press buttons and signal lights on the operator panel by studying the PACS 2000 manual in chapter 7.

Emergency stop

See ”Safety devices, a survey”, chapter 1 in the OPERATOR MANUAL.

Recorder

Follow instructions in the SERVICE MANUAL.

Printer

Follow instructions in the SERVICE MANUAL.

HAX033 . . . . . General industry. Not GEE

Start-up

Before start-up the operator chooses a suitable program. Where appropriate the operator specifies process parameters and other information requested by the control system.

The process is then started by pressing the start button.

Process start-up is prevented if:

- there is an unacknowledged alarm
- the door is not closed and interlocked in accordance with the conditions imposed
- the self-checking of the control system has detected a fault at the door limit switch
- the keyswitch for manual stepping is activated
- media supply (i.e. steam or cooling water) is not available (only if the sterilizer is equipped with pressure switches for this)
- the jacket temperature has not been reached (only if the process includes jacket heating.

HAX039 . . . . . General hospital

Start-up

Before start-up the operator chooses a suitable program. If this is a program other than one intended for routine sterilization, the operator must also enter his/her authorisation password and, in the case of programs having variable parameters, details of the necessary process parameters and other information requested by the control system.

The process is then started by pressing the start button.

Process start-up is prevented if:

- there is an unacknowledged alarm
- the door is not closed and interlocked in accordance with the conditions imposed
- the self-checking of the control system has detected a fault at the door limit switch

- the key switch for manual stepping or, where applicable, for the door interlock, is activated.
- media supply (i.e. steam, compressed air or cooling water) is not available (only of the sterilizer is equipped with pressure switches for this).
- the jacket temperature has not been reached or has been exceeded (only if the process includes jacket heating).
- the authorisation password has not been programmed (only for programs incorporating authorisation codes).

HAX083 . . . . . Messages on starting conditions Hospital Division

Messages

If the operator attempts to start the sterilizer despite starting being prevented, the display on the operator panel shows a message indicating an essential condition that is not met.

- JACKET TEMP HIGH - Indicates that lowering of jacket temperature is in progress.
- JACKET TEMP LOW - Indicates that raising of jacket temperature is in progress.
- STEPPING KEY ON - Indicates that key switch for stepping is on.
- DOOR NOT CLOSED - Indicates that a sterilizer door is not satisfactorily closed. (This message does not appear in the case of automatic doors).
- PRINTING ACTIVE - Indicates that printing from the printer is blocking the start of a new program.
- START CONDITION - Indicates that a starting condition specific to the type of unit is not met. (Compressed-air media, formalin bottle or ventilation in the case of formalin sterilizers).

HAX034 . . . . . Formaldehyde Delay on starting

Note that, when a formalin program is selected, a 45-minute stabilization period must elapse before the process may be started.

Alarm

If an error occurs in an idling or proceeding process the sterilizer will be brought into an alarm state. This is an extraordinary situation, but it is not dangerous. A proceeding process will be aborted and all executive units are automatically set so as to maintain safety for personnel, machinery and load.

The simultaneous events below are to draw attention to an alarm situation.

- an audio signal sounds
- the red light emitting diode PROCESS FAULT illuminates
- the nature of the error is shown on the lower display line in plain text
- with printer equipped sterilizers, the alarm text is printed out.

The error is automatically registered and stored in the error log which holds information about the latest twenty errors.

In case of an alarm:
Read the Error message.

Push button ”C”, thereby confirming the observation of the error and silencing the audio signal.

Alarm

If an error occurs in an idling or proceeding process the sterilizer will be brought into an alarm state. This is an extraordinary situation, but it is not dangerous. A proceeding process will be aborted and all executive units are automatically set so as to maintain safety for personnel, machinery and load.

The simultaneous events below are to draw attention to an alarm situation.

- an audio signal sounds
- the Process fault △) LED lights.
- the nature of the error is shown on the lower display line in plain text

- with printer equipped sterilizers, the alarm text is printed out.

The error is automatically registered and stored in the error log which holds information about the latest twenty errors.

In case of an alarm:
Read the Error message.

Push button ”C”, thereby confirming the observation of the error and silencing the audio signal.

Alarm

If an error occurs in an idling or proceeding process the sterilizer will be brought into an alarm state. This is an extraordinary situation, but it is not dangerous. A proceeding process will be aborted and all executive units are automatically set so as to maintain safety for personnel, machinery and load.

The simultaneous events below are to draw attention to an alarm situation.

- an audio signal sounds
- the red light emitting diode PROCESS FAULT illuminates (OP 3 only)
- the nature of the error is shown on the lower display line in clear text
- with printer equipped sterilizers, the alarm text is printed out.

The error is automatically registered and stored in the error log which holds information about the latest twenty errors.

In case of an alarm:
Read the Error message.

Push button ”F10”, thereby confirming the observation of the error and silencing the audio signal.

Alarm

If an error occurs in an idling or proceeding process the sterilizer will be brought into an alarm state. This is an extraordinary situation, but it is not dangerous. A proceeding process will be aborted and all executive units are automatically set so as to maintain safety for personnel, machinery and load.

The simultaneous events below are to draw attention to an alarm situation.

- an audio signal sounds
- the Process failure △ LED lights.
- the nature of the error is shown on the lower display line in clear text
- with printer equipped sterilizers, the alarm text is printed out.

The error is automatically registered and stored in the error log which holds information about the latest twenty errors.

In case of an alarm:
Read the Error message.

Push button ”F10”, thereby confirming the observation of the error and silencing the audio signal.

HAX019 . . . . . Alarm GEE OP3/ OPC

The sterilizer remains in the alarm state until either of the measures A or B below are taken.

A **If the fault is remediable**:

- Push button RESTART (F8) to resume the process at that very stage where the error occurred.

B **If the fault is irremediable:**
(the same error will occur repeatedly in a resumed process)
To proceed:

- Turn the key STEPPING.
- Use the button F9 to step forward to the process end, one step for each push of the button.

Note! Alarms may be designed to automatically terminate the cycle.

For safety reasons the possibility to step past a gas removal and a pressure equalisation phase is blocked.

On end of an aborted process, the light PROCESS END will not illuminate, but the red light PROCESS FAULT remains illuminated until manually extinguished by pushing the button F10 when the process has reached the STAND BY phase. Only the door on the loading side can be opened on end of an aborted process.

HAX020 . . . . . Alarm OP2 Hospital division

ALARM

If an error occurs during stand-by or in a proceeding process an audio signal and illumination of the “PROCESS ERROR” indicator light calls for attention.

In case of an alarm:
Push the button “C”. The audio signal ceases.
Read the display to see the error code and the process phase in which the error occurred.

The error codes are listed at the end of this section.

In case of an error concerning a temperature sensor, a pressure transducer or the Back-up battery a service technician is to be called for.

HAX042 . . . . . Alarm, general

The fault codes are explained later in this chapter.

In case of an error concerning a temperature sensor, a pressure transducer or the Back-up battery a service technician is to be called for.

HAX074 . . . . . Blowing safety valve

Blowing safety valve

In case the pressure safety valve (not with all sterilizers), on the chamber, blows:

- Press the EMERGENCY STOP button.
- If this has no effect, turn off the power using the control switch on the front of the sterilizer.
- In emergency, the power can be interrupted using the main switch.
- Send for a service technician without delay.

If the control switch or main switch have to be turned off while the sterilizer is in use and while there is a positive pressure inside it, there is a risk of leakage around the door.

KEEP AWAY FROM THE DOOR OR, IF THERE IS FORMALIN IN THE CHAMBER, LEAVE THE ROOM.

HAH006 . . . . . Blowing safety valve

Blowing safety valve

If the safety valve of the chamber or jacket (not present on all autoclaves) blows:

- Press the EMERGENCY STOP.
- If this does not have any effect, cut off the power supply by pressing the on/off switch on the front of the autoclave.
- The power supply can be cut in an emergency by pressing the working switch.
- Call a technician immediately.

If the autoclave on/off switch or the working switch has to be turned off during a process when overpressure prevails in the chamber, there is a risk of leaks at the door.

KEEP AWAY FROM THE DOOR OR LEAVE THE ROOM IF THERE IS A FORMALIN IN THE CHAMBER!

HAX022 . . . . . Alarm general. Hospital division

Idling sterilizer

An alarm situation on an idling sterilizer stops it from being started.

- Call for a technician.

Sterilizer in progress

An alarm situation on an sterilizer in progress breaks the cycle and causes the lamp Process end not to illuminate upon end of process.

There are three alternatives of action:

A faulty chosen process type, when processing liquids, can be hazardous to personnel and machines.

1. Start the process in the stage where the fault occurred by pressing the button Start. The error code on the display is cleared.
2. Put a fast end to the process utilizing an emergency process by pressing the program button that was activated when the fault occurred. An emergency program adapted for the process ends the process. The error code remains on the display.
3. Call for a technician which with key for the switch SK04 may interfere in the process including shifting programs. The error code remains on the display.

HAX043 . . . . . Alarm, general, hospital division

Idling sterilizer

An alarm situation on an idling sterilizer stops it from being started.

- Call for a technician.

Sterilizer in progress

An alarm situation on an sterilizer in progress breaks the cycle and causes the lamp Process complete not to illuminate upon end of process.

There are three alternatives of action:

A faulty chosen process type, when processing liquids, can be hazardous to personnel and machines.

1. Start the process in the stage where the fault occurred by pressing the button Start. ' error code on the display is cleared.
2. Put a fast end to the process utilizing an emergency process by pressing the program button that was activated when the fault occurred. An emergency program adapted for the process ends the process. The error code remains on the display.
   This facility is not available in programs with release numbers of ***P 6*** or above, having no program selection push-button.
3. Call for a technician which with key for the switch ***Stepping*** may interfere in the process including shifting programs. The error code remains on the display.

For safety reasons the possibility to step past a pressure equalisation or cooling phase is blocked.

HAX007 . . . . . Alarm general

Idling sterilizer

An alarm situation for an idling sterilizer stops it from being started.

- Call for a technician.

HAX008 . . . . . Alarm OP 2

Sterilizer in progress

An alarm situation for an sterilizer in progress breaks the cycle. The sterilizer remains in the alarm state until either of the measures A or B below are taken.

A **If the fault is remediable:**
Push button START to resume the process at that very stage where the error occurred.

B **If the fault is irremediable:**
Call for an authorized technician or any other authorized person. The technician will turn the key STEPPING and use the button C to step forward to the process end, one step for each push on the button.

For safety reasons the possibility to step past a pressure equalisation or cooling phase is blocked.

On end of an aborted process, the light PROCESS END will not illuminate, but the red light PROCESS FAULT remains illuminated until

manually extinguished by pushing the button C when the process has reached the STAND BY phase.

HAX081 . . . . . Alarm OP -Touch

Sterilizer in progress

An alarm situation for an sterilizer in progress breaks the cycle. The sterilizer remains in the alarm state until either of the measures A or B below are taken.

A **If the fault is remediable:**
Push button Start. Resume the process at that very stage where the error occurred.

B **If the fault is irremediable:**
Call for an authorized technician or any other authorized person. The technician will turn the key STEPPING and use the button “Stepp” (in the display) to step forward to the process end, one step for each push on the button.

For safety reasons the possibility to step past a pressure equalisation or cooling phase is blocked.

On end of an aborted process, the light PROCESS END will not illuminate, but the red light PROCESS FAULT remains illuminated until manually extinguished by pushing the button C when the process has reached the STAND BY phase.

HAX009 . . . . . Alarm OP 3 / OP C

Sterilizer in progress

An alarm situation for an sterilizer in progress breaks the cycle. The sterilizer remains in the alarm state until either of the measures A or B below are taken.

A **If the fault is remediable:**
Push button RESTART(F8) to resume the process at that very stage where the error occurred.

B **If the fault is irremediable:**
Call for an authorized technician or any other authorized person. The technician will turn the key STEPPING and use the button F9

to step forward to the process end, one step for each push on the button.

For safety reasons the possibility to step past a pressure equalisation or cooling phase is blocked.

On end of an aborted process, the light PROCESS END will not illuminate, but the red light PROCESS FAULT remains illuminated unt manually extinguished by pushing the button C when the process has reached the STAND BY phase.

HAX044 . . . . . Alarm FPC

Sterilizer in progress

An alarm situation for an sterilizer in progress breaks the cycle. All valves close, stabilising the conditions in the chamber.
The sterilizer remains in the alarm state until either of the measures A or B below are taken.

A **If the fault is remediable:**
Push button ***F8*** to resume the process at that very stage where the error occurred.

B **If the fault is irremediable:**
Call for an authorized technician or any other authorized person.
The technician will turn the key ***Stepping*** and use the button ***F9*** to step forward to the process end, one step for each push on the button.

For safety reasons the possibility to step past a pressure equalisation or cooling phase is blocked.

On end of an aborted process, the light ***Process complete*** will not illuminate, but the red light ***Process failure*** remains illuminated until manually extinguished.

HAX010 . . . . . General

Repeated alarms

In case repeated alarms make it impossible to end the cycle, let an authorized technician make the homing manually.

In case of several faults occurring, only the latest will be displayed.

Blowing safety valve

In case the safety valve (not with all sterilizers), on the chamber, blows:

- Press the EMERGENCY STOP button
- If ineffective, cut the power with the wall-mounted isolator.
- Call for a technician.

HAX023 . . . . . Alarm general

Extinguishing the error indicator

Push button **C** when the sterilizer works in stand by conditions to extinguish the lamp Error and erase the alarm code.

Repeated alarms

In case repeated alarms make it impossible to end the cycle, let a technician make the homing manually. In case of several faults occurring, only the last one will be displayed.

Note that transducer faults in certain phases have an influence on the manual control.
Manual stepping has to be carried out by trained personnel only.

Printer

Where a main error causes one or more secondary errors, the operator panel shows only the last error that occurred. However, if the sterilizer is equipped with a printer, all errors are printed out, together with the time when they occurred.

HAX045 . . . . . Alarm general FPC,OPC,OPH.

Extinguishing the error indicator

Extinguish the ***Process fault*** LED using the F10 key when the sterilizer has reached the stand-by state and the loading door has opened.

Repeated alarms

If several faults should occur together, the display will show details of the one that occurred most recently.

Note that transducer faults in certain phases have an influence on the manual control.
Manual stepping has to be carried out by trained personnel only.

Printer

Where a main error causes one or more secondary errors, the operator panel shows only the last error that occurred. However, if the sterilizer is equipped with a printer, all errors are printed out, together with the time when they occurred.

HAX024 . . . . . Opening the door after an error. Hospital division.

Doors

When a fault has occurred, the unloading door of a double ended sterilizer will not open but the loading door does. An exception is when the fault occurs late in the process when evacuation of the door seal groove has already started.

The door can only be opened when the correct password has been entered. For further information, see the menu description in the section about control system PACS 2000.

HAX063 . . . . . General. Opening the doors after a fault

Doors

When a fault has occurred, the unloading door of a double ended sterilizer will not open but the loading door does. An exception is when the fault occurs late in the process when evacuation of the door seal groove has already started.

The door can be opened only when the correct password has been entered. For further information, see the menu description in the PACS 2000 CONTROL UNIT chapter.

HAX075 . . . . . General, steam generator

Steam generator

The steam generator fault alarm can be generated either by the normal operating pressure being exceeded or by the water level in the generator dropping below the lowest permissible level. The fact that the water level has fallen can be an indication that the steam generator water quality is becoming poor, and that therefore it is necessary to drain the water from the system.
Call a service technician who can identify and correct the fault in accordance with the description in the GENERAL ADVICE chapter.

NOTE!
In the event of sustained lifting of the steam generator safety valve, and if the chamber is also pressurised, turn off the sterilizer control power switch only as a last resort, as this renders certain safety features inoperative. Instead, immediately call a service technician who can turn off the steam generator's MCBs.

HAH002 . . . . . Autoclave with stand-alone steam generator, Hospital

Steam generator

The ***steam generator*** alarm may be due to the operating pressure having been exceeded or the minimum water level of the steam generator not having been reached. If the minimum water level is not reached, this may be an indication that the water quality in the steam boiler is starting to become very poor and that the water therefore needs to be drained.
Call a service engineer who can analyse and remedy the fault using the steam generator manual.

HAX077 . . . . . General steam generator 19 kW

Steam generator

The **Steam generator** alarm may be due to the operating pressure having been exceeded or the water level in the steam generator having dropped below the minimum. The water level falling below the minimum may be an indication that the quality of water in the steam boiler is becoming very poor and that it is therefore necessary to drain the water.

Call a service engineer who can analyse and rectify the fault using the description in the chapter on ADVICE AND INSTRUCTIONS.

IMPORTANT

To be noted with when the safety valve on the steam generator blows over a prolonged period if the chamber is simultaneously under pressure.

Turn off the operating switch of the sterilizer only as a last resort, as there is a risk of leakage at the door.

Keep away from the door at such times.

HAX073 . . . . . General, steam converter

Steam generator

The steam generator fault alarm can be generated by the water level in the generator dropping below the lowest permissible level.
Call a service technician who can correct the fault.

NOTE!
In the event of sustained lifting of the steam generator safety valve, and if the chamber is also pressurised, turn off the sterilizer control power switch only as a last resort, as this renders certain safety features inoperative. Instead, immediately call a service technician who can turn off the steam generator's MCB.

HAH003 . . . . . Unloader, Pull

Automatic unloader

Fault in unloading on the unloading side of the autoclave

The words STOP UNLOADING appear on the operator panel on the loading side. Information on suitable action to take is contained in a separate manual for the unloader.

After a process fault has occurred, the items must be unloaded on the loading side of the autoclave as only the loading door can be opened.

Automatic charger

Connection
The charger is connected to the sterilizer by a socket marked

which is located on the front of the sterilizer.

Breakdowns
If pre-programmed automatic charging has been selected for an automatic loader, this is disconnected after a power failure. This is indicated by the lamp in the charging button of the loader going out.

After a power failure a loading or unloading cycle that has been started must always be reset using the separate reset button of the charger.

Faults in unloading on the sterilizer discharge side
The message STOP UNLOADING appears on the operator panel on the loading side and the *open door* lamp flashes on the operator panel on the unloading side.

If extra unloading is not necessary
Close the door manually be pressing the *close door* button.

If a load is left in the chamber

1. Check that the load has not become caught.
2. Make sure that the web on the unloader is empty and that nothing else can stop it from working.
3. Start a new unloading operation by pressing the *open door* button.The message on the display on the loading side changes to MAN. UNLOADING.

The procedure can be repeated if the unloading is not completed correctly (e.g. after the emergency stop button has been pressed).

HAX091 . . . . . Charger feeder

Items must be unloaded on the feed side of the sterilizer after a sterilizer process fault as only the loading door can be opened

1. Make sure that the sterilizer door on the loading side has been opened, that the web on the loader is empty and that nothing else can stop it from working.

2. Select program 20 sing the arrow key on the operator panel on the loading side when the sterilizer is in the resting phase. MAN UNLOADING appears on the display and the lamp in the start button lights up. The loader has now been converted to an unloader.
3. Press the start button.
4. Enter authorisation code. The loader now unloads the items.

If the message STOP UNLOADING appears on the operator panel, the unloading program has not been completed correctly (e.g. after an emergency stop). After the fault has been rectified and "Reset" has been activated on the loader, the unloading cycle can be repeated by pressing the sterilizer start button again. It is not necessary to key in the authorisation code in this kind of restart because unloading is not started from the stand-by phase.

Error codes

The error messages listed below are defined in the control system. If more than one error occurs consecutively, only the error code for the last error is displayed.

If the sterilizer is equipped with a printer, the error message is printed out. For secondary errors, all error messages are printed out.

Information about the last twenty faults is saved in the control system and is accessible in the service menu. If the sterilizer has a printer, this information can be printed out.

Service codes

When the word “Service” flashes on the display, service must be carried out by a service technician. See below for explanations of the codes.

NOTE:
No error has occurred.
The sterilizer can still be used.

Error codes

The error messages listed below are defined in the control system. If more than one error occurs consecutively, only the error code for the last error is displayed.

If the sterilizer is equipped with a printer, the error message is printed out. For secondary errors, all error messages are printed out.

Information about the last twenty faults is saved in the control system and is accessible in the service menu. If the sterilizer has a printer, this information can be printed out.

Service codes

When the word SERVICE appears on the display, service is required and must be carried out by a service technician. See below for explanations of the codes.

NOTE:
No error has occurred.
The sterilizer can still be used.

Error code	Explanation
Battery error	The backup battery of the system is flat. Programs and stored parameters may have been lost.
Temp. sens. error	One or more temperature sensors faulty
Press. tr. error	Pressure transmitter faulty

Mistakes when correcting the above types of error may lead to situations where there is a risk of injury.
Always call a trained service technician.

Error code	Explanation
Door lock error	Door(s) not locked.
Gasket failure	Door gasket pressure low
Door fault	Door(s) not closed.
Pump failure	Vacuum pump stopped
Temp. error	The chamber temperature has been outside the permitted limits during the sterilization or disinfection phase.
Validation	This text is not activated. It can be activated with OPC after an interval has been set. See the menu description in the chapter about the control system in the “Service manual”.
Time error	The phase named on the display exceeded the time limits for completion. Check whether the cause is component fault or media fault.
Service	This text appears when the programmed service interval has elapsed and the current process is complete. The text continues to flash until it is deactivated by the service technician. *The sterilizer can still be used.* Call a service engineer immediately.
Leak test error	An automatic leak test failed. NOTE: Not on all sterilizers
Supervisor error	There has been an error in the monitoring of the load temperature.
Power failure	There has been a power failure longer than 10 seconds.
Emerg. shutdown	The program has been stopped with the emergency stop button.
Steam gen. Error	The supply of feed water to the steam generator has stopped.

Error code	Explanation
Battery error	The backup battery of the system is flat. Programs and stored parameters may have been lost.

Error code	Explanation
Temp. sens. error	One or more temperature sensors faulty
Press. tr. error	Pressure transmitter faulty

Mistakes when correcting the above types of error may lead to situations where there is a risk of injury. Always call a trained service technician.

Error code	Explanation
Pressure error	The chamber pressure has been outside permitted limits for a part of the process.
Press. error	The jacket temperature has been outside permitted limits for a part of the process.
Emerg. evacuate	Emergency evacuation of the process because pressure or temperature is too high.
Gasket failure	Door gasket pressure low
Door fault	Door(s) not closed and locked
Pump failure	Vacuum pump stopped
Temp. error	On steam program. The chamber temperature has been outside permitted limits during the sterilization phase. On formalin program. The chamber temperature has been outside permitted limits for a part of the process.
Validation	This text is not activated. It can be activated with OPC after an interval has been set. See the menu description in the chapter about the control system in the “SERVICE MANUAL”.
Time error	The phase named on the display exceeded the time limits for completion. Check whether the cause is component fault or media fault.
Service	This text appears when the programmed service interval has elapsed and the current process is complete.The text continues to be displayed until it is de-activated by the service technician. *The sterilizer can still be used.* Call a service engineer immediately.

Error code	Explanation
Leak test error	An automatic leak test failed. NOTE: Not on all sterilizers
Supervisor error	The Supervisor's independent monitoring of process time and temperature conditions has indicated that some/all have not been fulfilled and have triggered an alarm. NB: This feature is included in only the most advanced Supervisor model.
Power failure	There has been a power failure longer than 10 seconds.
Emerg. shutdown	The program has been stopped with the emergency stop button.
Steam gen. Error	The supply of feed water to the steam generator has stopped.
Vacuum fault	The vacuum pump has not drawn a sufficiently deep vacuum. NB: Only on formalin sterilizers.
Stop unloading	An unloading cycle with an automatic feeder or discharger has not been completed correctly.
Form interlock	One of the three safety conditions for formalin programs has not been fulfilled: 1. Compressed air supply to the sterilizer has failed. 2. The formalin bottle has not been fitted. 3. Ventilation is not sufficient.
Door interlock	The independent safety interlocking of media admission to the chamber, as controlled by the door switch, is faulty. NB: Not on all sterilizers.
Seal interlocking	The independent safety interlocking of media admission to the chamber, as controlled by the seal pressure switch, is faulty. NB: Not on all sterilizers.
Pressure interlocking	The independent safety interlocking of the door function, as controlled by the chamber pressure switch or the Supervisor, is faulty. NB: Not on all sterilizers.

Error code	Explanation
Temp. interlocking	The independent safety interlocking of the door function, as controlled by the load sensor with thermostat or the Supervisor, is faulty. NB: Not on all sterilizers.

Error code	Explanation
Battery error	The backup battery of the system is flat. Programs and stored parameters may have been lost.
Temp. sens. error	One or more temperature sensors faulty.
Press. tr. error	Pressure transmitter faulty.

Mistakes when correcting the above types of error may lead to situations where there is a risk of injury. Always call a trained service technician.

Error code	Explanation
Pressure error	The chamber pressure has been outside permitted limits for a part of the process.
Press. error	The jacket temperature has been outside permitted limits for a part of the process.
Emerg. evacuate	Emergency evacuation of the process because pressure or temperature is too high.
Gasket failure	Door gasket pressure low.
Door fault	Door(s) not closed.
Door lock fault	Door(s) not locked.
Pump failure	Vacuum pump stopped.
Temp. error	On steam program. The chamber temperature has been outside permitted limits during the sterilization phase. On formalin program. The chamber temperature has been outside permitted limits for a part of the process.

Error code	Explanation
Validation	This text is not activated. It can be activated with OPC after an interval has been set. See the menu description in the chapter about the control system in the “SERVICE MANUAL”.
Time error	The phase named on the display exceeded the time limits for completion. Check whether the cause is component fault or media fault.
Service	This text appears when the programmed service interval has elapsed and the current process is complete.The text continues to be displayed until it is de-activated by the service technician. *The sterilizer can still be used.* Call a service engineer immediately.
Leak test error	An automatic leak test failed. NOTE: Not on all sterilizers
Supervisor error	The Supervisor's independent monitoring of process time and temperature conditions has indicated that some/all have not been fulfilled and have triggered an alarm. NB: This feature is included in only the most advanced Supervisor model.
Power failure	There has been a power failure longer than 10 seconds.
Emerg. shutdown	The program has been stopped with the emergency stop button.
Steam gen. Error	The supply of feed water to the steam generator has stopped.
Vacuum fault	The vacuum pump has not drawn a sufficiently deep vacuum. NB: Only on formalin sterilizers.
Stop unloading	An unloading cycle with an automatic feeder or discharger has not been completed correctly.
Form interlock	One of the safety conditions for formalin programs has not been fulfilled.
Door interlock	The independent safety interlocking of media admission to the chamber, as controlled by the door switch, is faulty. NB: Not on all sterilizers.

Error code	Explanation
Seal interlocking	The independent safety interlocking of media admission to the chamber, as controlled by the seal pressure switch, is faulty. NB: Not on all sterilizers.
Pressure interlocking	The independent safety interlocking of the door function, as controlled by the chamber pressure switch or the Supervisor, is faulty. NB: Not on all sterilizers.
Temp. interlocking	The independent safety interlocking of the door function, as controlled by the load sensor with thermostat or the Supervisor, is faulty. NB: Not on all sterilizers.

Using operator panel OP2 in operation

Operator panel OP2 can be used for a large number of readings, settings and service actions. The various features are accessed by using the arrow keys to “move” to the relevant menu in the menu tree. For further details see the section that describes the various menus. This section can be found in the chapter about the control system.

In daily use, all functions that can be used to perform changes or service actions are barred with codes.
This means that the operator can use the display to read accessible parameters when the sterilizer is operating.

Available information

The arrow keys may be used to scroll up the following information:

Menu 0000 Basic display

This menu shows which program is running, what it is intended for and the programmed sterilizing temperature and time.

Menu 0100 (reached with ➔)
This menu shows the current process phase, chamber temperature and elapsed phase time.

Menu 0101 (reached with ➔)
Submenu to 0100. In the basic version, this menu shows a number of variables, whose current value it may be useful to know. All the variables of the basic version are listed below. Depending on the type of ster-

ilizer and the processes available, some variables may be omitted and others may be added.

Possible variables:

1. Chamber temp.
2. Load temp.
3. Jacket temp.
4. Chamber pressure
5. Sterilizing time
6. F_0 value
7. Post-vacuum time
8. Postpuls. steam
9. Postpuls. air
10. Leaktest time
11. Cycle counter

Password

When a password protected program (see the program combination) is chosen, the menu display switches to password entry. This happens immediately after the program starts. When the correct password i entered, the process display returns. If the wrong password or no password is entered, the program returns to stand-by within one minute.

On process error, or when a password is needed to open the door, the menu display switches to password entry. If the wrong password or no password is entered, the program returns to the previous display within one minute.

HAX049 . . . . . FPC, use. Hospital division

Using operator panel FPC in operation

Operator panel FPC can be used for a large number of readings, settings and service actions. The various features are accessed by using the arrow keys to “move” to the relevant menu in the menu tree. For further details see the section that describes the various menus. This section can be found in the chapter about the control unit.

In daily use, all functions that can be used to perform changes or service actions are barred with codes.
This means that the operator can use the display to read accessible parameters when the sterilizer is operating.

Password

When a password-protected program (see the program combination) is chosen, the menu display will request entry of the password. This happens immediately after the program starts. When the correct password has been entered, the process continues automatically.If the wrong pass-

word or no password is entered, the program returns to stand-by within one minute.

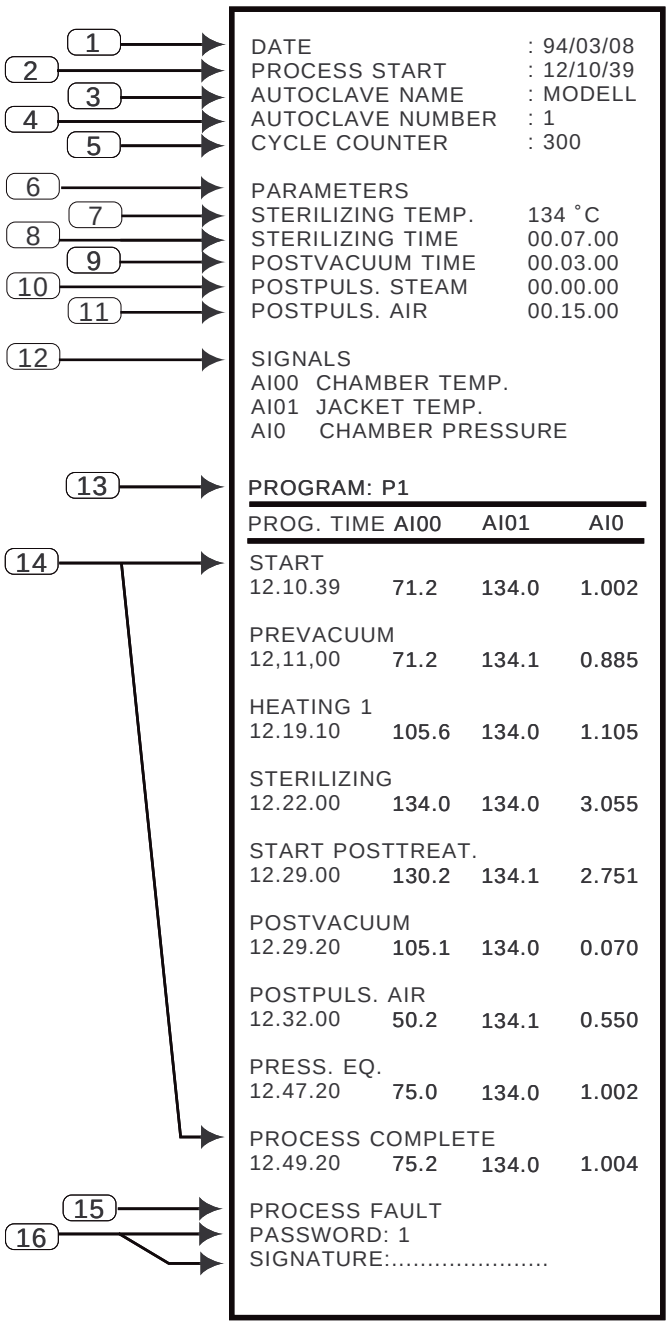
In the event of a process fault, or when a password is required in order to be able to open the door, the menu display requests entry of the password. If the wrong password, or no password, is entered, the door cannot be opened.

HAX028 . . . . . Printer.Process data. Hospital division.

Printer, process data

The sterilizer has a printer which prints out process data for each process on a 57 millimetre paper tape.

1	Date in the format day/ month/year. (For Sweden, year/month/day)
2	Time sterilizer was started, using the 24-hour clock.
3	Sterilizer type designation or symbolic name
4	Sterilizer number, a number between 1 and 99 which is used during communication between several PACS 2000 units.
5	Cycle counter for up to 65,535 processes.
6	Listed under the heading PARAMETERS, the parameters in the current program that can be changed with a parameter code. In this example Sterilizing temperature (7) in °C and times for various (8-11) in hours, minutes and seconds.
12	Listed under the heading SIGNALS, the parameters chosen for printing.
13	Name of started program.
14	Process logging
15	Printed out if an error occurs during the process.
16	These lines are printed out after a faulty process. Code identification of the person who entered the password, and one line for initialling.

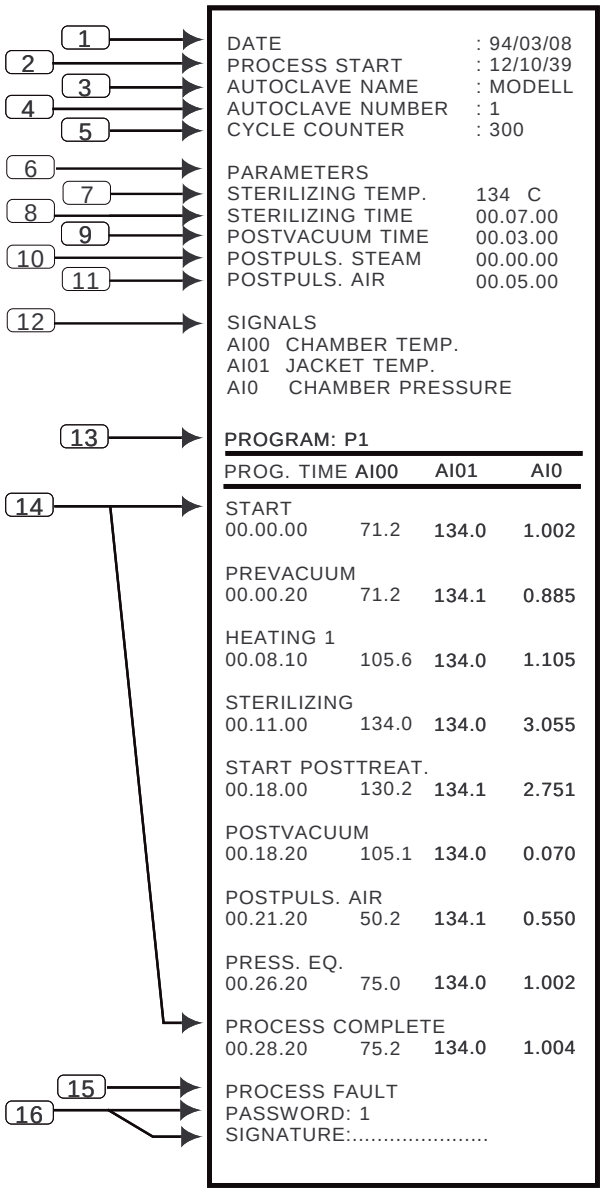


Printer, process data

The sterilizer has a printer which prints out process data for each process on a paper tape.

The picture below is schematic and is not to be used as a model for evaluating individual process results.

1	Date in the format day/ month/year. (For Sweden, year/month/day)
2	Time sterilizer was started, using the 24-hour clock.
3	Sterilizer type designation or symbolic name
4	Sterilizer number, a number between 1 and 99 which is used during communication between several PACS 2000 units.
5	Cycle counter for up to 65,535 processes.
6	Listed under the heading PARAMETERS, the parameters in the current program that can be changed with a parameter code. In this example Sterilizing temperature (7) in °C and times for various (8-11) in hours, minutes and seconds.
12	Listed under the heading SIGNALS, the parameters chosen for printing.
13	Name of started program.
14	Process logging
15	Printed out if an error occurs during the process.
16	These lines are printed out after a faulty process. Code identification of the person who entered the password, and one line for initialling.



Printer, process data

The sterilizer includes an independent printer, connected via a mains cable and a signal cable.

- The mains cable must be connected to the socket indicated by the mains current symbol, **E110** and **230 V**.
- The signal cable must be connected to the socket marked ***E 110.***

Handle the mains contact carefully: remember that the voltage on it is 230 V.

Operation

During operation, the printer is managed by the control unit. When changing paper or tearing off a completed printout, the paper can be fed forward manually by pressing the ***LF/FF*** button.

- A brief push feeds the paper forward by one line.
- Holding the button down feeds out a whole page.

Never attempt to feed the paper by turning the knob on the side of the printer. The knob is connected to the drive mechanism and it or the mechanism can be damaged.

Printer, process data

The sterilizer is equipped with a stand-alone printer, which is connected with a mains plug and a signal cable.

- The mains plug is to be connected to the socket marked with the heavy-current symbol, **E110** and **230 V** on the casing of the printer transformer or on a separate plastic box.

- The signal cable is permanently connected to the control box via a strain-relieved grommet. This is marked **E110**,

Handle the mains plug with care. Bear in mind that the mains socket carries 230 V.

Operation

The printer is dealt with by the control unit during operation. To change paper or when a finished printout is to be torn off, the paper can be advanced manually by pressing the ***LF/FF*** button.

- A short press advances one line.
- If the button is held down, a whole page is advanced.

Never feed paper by turning the knob on the side of the printer. The knob is braked and may be damaged.

HAX029 . . . . . Label printer. Hospital division

Label printer

The sterilizer has a printer which prints out a number of labels *after each completed fault-free process.* When the sterilizer is in the stand-by mode (no process running), the required number of labels can be programmed in one of the submenus of menu **0400** (see the menu description in the section headed “Control system PACS 2000”). The programmed number of labels remains in the memory until it is changed again.

Example:

P1 POROUS LOAD	134.0 °c	7 MIN.
STERILIZER TYPE	CYCLE COUNTER 2654	
PROCESS START	08/03/94	09:05:30
PROCESS COMPLETE		09:45.15

Line 1 Designation of process, chosen sterilization temperature and sterilization time.

Line 2	Designation of sterilizer, internal sterilizer number and cycle number of the process that was run.
Line 3	Date and time the process was started.
Line 4	Time the process was started.

Label printer

The sterilizer has a printer which prints out a number of labels *after each completed fault-free process*. When the sterilizer is in the stand-by mode (no process running), the required number of labels can be programmed in one of the sub-menus for the selected program (see the menu description in the PACS 2000 CONTROL UNIT chapter) The programmed number of labels remains in the memory until it is changed again.

Example:

P1	
121.0 C	00.20.00
DATE	15 / 06 / 96
STERILIZER NO.	1
CYCLE COUNTER	3450
START	09:05:30
END	09:45:15

Line 1	Process designation.
Line 2	Selected sterilization temperature and sterile time.
Line 3	Date.
Line 4	Sterilizer name, internal sterilizer number.
Line 5	Cycle number of the process.
Line 6	Time when the process was started.
Line 7	Time when the process was concluded.

The printer is connected by means of a mains cable and a signal cable.

- The mains cable must be connected to the socket indicated by the mains current symbol, **E117** and **230 V**.
- The signal cable must be connected to the socket marked ***E 117.***

Handle the mains contact carefully: remember that the voltage on it is 230 V.

HAM004 . . . . . Label printer GE 2044, GEF-449.

Label printer

The sterilizer is provided with a stand-alone printer which prints out a number of labels after each completed, fault-free process.
When the sterilizer is in the standby position (no process is being run), the desired number of labels can be programmed in one of the submenus for the selected program (see menu description in the chapter headed CONTROL UNIT PACS 2000). The programmed number of labels then stays in the program until it is changed again.

Example of steam program:

P1	
121.0 C	00.20.00
DATE	15 / 06 / 96
STERILIZER NO.	1
CYCLE COUNTER	3450
START	09:05:30
END	09:45:15

Example of formalin program:

P2	
65.0 C	00.30.00
DATE	15 / 06 / 96
STERILIZER NO.	1
CYCLE COUNTER	3450
START	09:05:30
END	11:45:15

Line 1	Designation of process.
Line 2	Selected sterilization temperature and sterilization time.
Line 3	Date.
Line 4	Name of sterilizer, internal sterilizer number.
Line 5	Cycle number of the process being run.
Line 6	Time when the process was started..
Line 7	Time when the process was completed.

The printer is connected with a mains plug and a signal cable.

- The mains plug is to be connected to the socket marked with the heavy-current symbol, **E117** and **230 V** on the casing of the printer transformer or on a separate plastic box.

- The signal cable is permanently connected to the control box via a strain-relieved grommet**.** This is marked **E117**.

Handle the mains plug with care. Bear in mind that the mains socket carries 230 V.

HAX026 . . . . . General. Hospital division

General advice when using the sterilizer

- Keep the sterilizer door closed when not sterilizing.
- If there is a demand for an extra dry load and time permits, leave the load for a while in the chamber with the door open.
- Be alert to everything that appears unusual such as leaks, humming solenoid valves, stickily mechanical devices etc. Remedy the situation before it becomes a malfunction

When loading:

- Arrange bowl shaped articles with the hollow part downwards.
- Empty containers (bottles, flasks, test glasses etc.) should be placed with their openings facing downwards.
- Heavy goods with great thermal capacity should be placed near bottom of the chamber.

HAX072 . . . . . General. Hospital division

General advice when using the sterilizer

- Keep the sterilizer door closed when the unit is not in use.
- If it is difficult to get items dry, the post-treatment stage can be modified. See the separate guide, STERILIZATION WITH STEAM.
- Read the section on packaging materials, loading and unloading in the STERILIZATION WITH STEAM guide.

- Be alert to everything that appears unusual such as leaks, humming solenoid valves, stickily mechanical devices etc. Remedy the situation before it becomes a malfunction.

HAM005 . . . . . GEF-449

General advice on use of the sterilizer

- Keep the sterilizer door closed when the sterilizer is on standby.
- Watch out for anything that does not appear natural, such as leaks, humming solenoid valves, scrapping mechanical parts etc. Deal with what appears to be merely a blemish before it causes breakdowns in operation!

HAX011. . . . . General

General advice when using the sterilizer

- Keep the sterilizer door closed when not sterilizing.
- Be alert to everything that appears unusual such as leaks, humming solenoid valves, jamming mechanical devices etc. Remedy the situation before it becomes a malfunction

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HAH001 . . . . . Sterilizer with load sensors and a chamber that can be entered

When loading:

- Whenever entering the sterilizer chamber, remove the DOOR BLOCKAGE KEY from its key switch.
- Place all load sensors in the load. Beware of not to cut or run over the sensor cables when loading and unloading, as well as when closing the doors.

HAX012 . . . . . Sterilizer <714xx having load sensors

When loading:

- Place all load sensors in the load. Be careful not to cut or run over the sensor cables when loading and unloading, as well as when closing the doors.

HAX013 . . . . . Sterilizer with vacuum process

When running Steam/vacuum process:

- Arrange bowl shaped articles with the hollow part downwards.
- Empty containers (bottles, flasks, test glasses etc.) should be placed with their openings facing downwards.
- Heavy goods should be placed near bottom of the chamber.

HAX035 . . . . . Sterilizer with vacuum process and a chamber that can be entered

When running a Steam/vacuum process:

- Whenever entering the sterilizer chamber, remove the DOOR BLOCKAGE KEY from its key switch.
- Arrange bowl shaped articles with the hollow part downwards.
- Empty containers (bottles, flasks, test glasses etc.) should be placed with their openings facing downwards.
- Heavy goods should be placed near bottom of the chamber.

HAX017 . . . . . GEE general

After sterilization:

- If the sterilizer should not be used immediately, let it serve as an aerator by leaving the load in the sterilizer with closed door. The warm atmosphere will help removing gas residuals.
- Make sure the exhausts are on while unloading gas-sterilized goods.
- Do not touch recently gas-sterilized items unless gloves are used.
- Use trolley or basket for transportation of gas-sterilized goods.
- Pull, do not push a gas-sterilized load when moving it.

Monitoring the load temperature when sterilizing liquids

If the door on a sterilizer, containing a load of liquids, is opened before the liquid temperature has fallen below a certain maximum, closed bottles may explode while open containers boil over.
The course may develop violently with great danger to human life and technical equipment.

Safety arrangements

One or several temperature sensors in the load are sensing the temperature in the liquid and takes part in the process by keeping the sterilizer doors closed until the temperature is safely below the boiling point. An alarm will be emitted in case of a break or short circuit in the sensor.

HAX014 . . . . . General

Weekly cleaning (to be made by the daily operator)

The sterilizer should have cooled down before cleaning.

To reduce the risks for injuries, shut the power of.

1. Clean the chamber drain strainer.
2. a) Remove guides shelves and loose plates.
   b) Clean the chamber internally.
   c) A non chloric cleaner should be used. If particularly stubborn scouring powder or chrome cleaner could be used occasionally.
   Steel wool must never be used!
   Sterilizers frequently used for sterilization of chloric solutions demand thorough cleaning as residuals may cause serious corrosion even in stainless materials. An acetified cleaner is best suited for this purpose. Thorough rinsing is however essential.
3. Clean the sterilizer external stainless steel surfaces with a normal household cleaner that does not contain abrasive. Take care when cleaning lacquered surfaces, texts and plastic articles.

Weekly cleaning

Cleaning the exterior

Clean the external stainless steel surfaces of the sterilizer with a normal non-abrasive household cleaner. Take care when cleaning painted surfaces, texts and plastic parts.

Cleaning the chamber

When cleaning the inside of the chamber, use the key switch on the front of the machine to lock the door in the open position and turn off chamber preheating.
On double-ended sterilizers, the same key switch also controls opening and securing of the discharge door for improved accessibility.

1. With the sterilizer in the stand-by mode, turn the key switch and remove the key. The text, Door interlock, ⟷ appears on the operator's display panel.
2. Open the door by pressing the door push-button ⟷ and allow the sterilizer to cool.

Allow the sterilizer to cool completely before cleaning it. In order to avoid anyone accidentally resetting the key switch, the person performing the cleaning must always carry the key with him/her when he/she cannot see the switch.

3. Clean the strainer in the chamber floor drain.
4. Remove any shelves, guides, bottom plates etc. and clean the interior of the chamber.
   Use a general-purpose chlorine-free cleaner. If deposits or dirt etc. are particularly stubborn, scouring powder can be occasionally used. Never use steel wool.
   Sterilizers used frequently for sterilization of products containing salt require particularly careful cleaning, as residual deposits can cause serious corrosion even of stainless materials. An acid cleaner is most suitable for this purpose, although thorough rinsing is essential.
5. After cleaning, insert the key in the key switch and turn it to the normal position. Close the door using the door push-button.

6. The discharge door of double-ended sterilizers can be opened for cleaning by repeating the procedure in it ems 1-5.
7. On conclusion of cleaning, close both doors and leave the key in the key switch.

HAH004 . . . . . Cleaning. Chamber with interlocking key, sideways-opening

Weekly cleaning

External cleaning

Clean stainless-steel surfaces on the outside of the autoclave with a normal household cleaning agent which does not contain abrasives. Clean painted surfaces, lettering and plastic parts carefully.

Cleaning of chamber

Clean stainless-steel surfaces on the outside of the autoclave with a normal household cleaning agent which does not contain abrasives. Clean painted surfaces, lettering and plastic parts carefully.

1. Turn the key switch with the autoclave in stand-by mode and remove the key. The words ***Door interlocking*** ←I I→ ⦵on the display of the operator panel.
2. Open the door by pressing the door button ←I I→ e side to be cleaned. Leave the autoclave to cool.

The autoclave must be cool when it is cleaned.
To avoid anyone mistakenly resetting the key switch, the person carrying out the cleaning should always take the key with him or her if the key switch cannot be kept in view.

3. There is also a pneumatic key switch on the front panel, alongside each door. The person entering the autoclave chamber should always take the key with him or her. When the key is removed from the key switch, closing of the door is blocked pneumatically.
4. Clean the screen in the bottom outlet of the chamber.
5. Remove any shelves, guides and bottom plates and clean the autoclave chamber internally.
   Use a chlorine-free general cleaning agent. Scouring powder can occasionally be used on difficult stains. ***Never use steel wool.***
   Autoclaves which are used often for the sterilization of salt-containing products require particularly careful cleaning as residual depos-

its cause corrosive attack even on stainless steel. An acidic cleaning agent followed by careful rinsing is most suitable for the purpose.

6. Insert the keys into the key switches after the cleaning operation and reset to the starting position. Then close the door by pressing the appropriate door button.
7. After cleaning has been completed, both doors must be closed and the keys remain in the key switches.

HAX018 . . . . . GEE general

8. Check the air-in filter for a tight and rigid attachment.
9. Check by means of the appropriate sight glasses that the recirculation- and expansion tank contain sufficient amount of water.

HAX082 . . . . . Moisture meter. Cleaning the tank

10. Clean the moisture meter water tank.

HAX037 . . . . . Sterilizer with load sensors and a chamber that can be entered.

Whenever entering the sterilizer chamber, remove the DOOR BLOCKAGE KEY from its key switch.

- Place all load sensors in the load. Beware of not to cut or run over the sensor cables when loading and unloading, as well as when closing the doors.

HAX038 . . . . . Sterilizer with a chamber that can be entered.

Whenever entering the sterilizer chamber, remove the DOOR BLOCKAGE KEY from its key switch.

HAX027 . . . . . Sterilizers with combined steam supply.

Sterilizers with combined steam supply

When a steam generator has been left out of operation for a longe period, the unit should be served by a trained technician before putting it into operation again.

This service is described in the SERVICE MANUAL.

HAH005 . . . . . Autoclaves with double steam supply

Autoclaves with double steam system

When a built-in or stand-alone steam boiler has been out of operation for a prolonged period, it should be overhauled by a trained technician before being put back into operation.

This overhaul is described in the SERVICE MANUAL of the autoclave or the stand-alone steam generator.

HAX036 . . . . . Formaldehyde GED

General advice for formaldehyde sterilizer

Formaldehyde is toxic by inhaling, drinking and in contact with the skin. It is cancerogenic and allergenic. If in contact with the eyes, there is a big risk for severe eye damages.

Formaldehyde gas in certain mixtures with air is explosive.

Place of installation

- Showers for eyes and emergency showers shall be available.
- Absorbents shall be available.
- Local and national requirements are to be followed.
- See also chapter *Installation.*

Bottles for formaldehyde.

For safety reasons it is important that the right type and quality of bottles are used.
The cap has to be strong and undamaged, in order to resist an overpressure of 4 bar. This is also valid for empty bottles used for cleaning cycles.
It is important that the right amount of formaldehyde is used during sterilization.

Follow the instructions in the OPERATING INSTRUCTIONS.

Error

Should an error occur, due to too high temperature or too high pressure in the chamber, the process ends automatically with an emergency program.

If this ending does not occur, at errors due too high pressure, the chamber shall be evacuated through the vacuumpump.

- First, press the stop-button. Pull the stop-button and follow the instructions in *ALARM Sterilizer in progress*, alternative 2.
- If necessary, the evacuation can be done by manually control of the vacuumpump. This is only to be done by trained technicians.

There is a risk for formaldehyde gas coming from the sterilizer chamber, if a door is manually opened

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HAX054 . . . . . Formaldehyde general

General advice for formaldehyde sterilizer

Formaldehyde is toxic by inhaling, drinking and in contact with the skin. It is cancerogenic and allergenic. If in contact with the eyes, there is a big risk for severe eye damages.

Formaldehyde gas in certain mixtures with air is explosive.

Place of installation

- Showers for eyes and emergency showers shall be available.
- Absorbents shall be available.
- Local and national requirements are to be followed.
- See also chapter INSTALLATION.

Bottles for formaldehyde.

For safety reasons it is important that the right type and quality of bottles are used.
The cap has to be strong and undamaged, in order to resist an overpressure of 4 bar. This is also valid for empty bottles used for cleaning cycles.
The bottles must be filled and closed by trained personnel, working

under safe conditions. Until they are used, filled bottles must be stored in a locked and marked cupboard, specifically intended for the purpose.

It is important that the correct quantity of formalin is used for sterilization.
Follow the instructions in the OPERATING INSTRUCTIONS.

Error

Should an error occur, due to too high temperature or too high pressure in the chamber, the process ends automatically with an emergency program.
In the event of a fault in the emergency program, an alarm can be generated using the emergency stop push-button.
As a final resort, the chamber must be evacuated using the vacuu pump.

- First, press the stop-button. Pull the stop-button and follow the instructions in *ALARM Sterilizer in progress*, alternative 2.
- If necessary, the evacuation can be done by manually control of the vacuumpump. This is only to be done by trained technicians.

There is a risk for formaldehyde gas coming from the sterilizer chamber, if a door is manually opened

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HAX078 . . . . . Formaldehyde general

General advice for formaldehyde sterilizer

Formaldehyde is toxic by inhaling, drinking and in contact with the skin. It is cancerogenic and allergenic. If in contact with the eyes, there is a big risk for severe eye damages.

Formaldehyde gas in certain mixtures with air is explosive.

Place of installation

- Showers for eyes and emergency showers shall be available.
- Absorbents shall be available.
- Local and national requirements are to be followed.
- See also chapter INSTALLATION.

Bottles for formaldehyde.

For safety reasons it is important that the right type and quality of bottles are used.
The cap has to be strong and undamaged, in order to resist an overpressure of 4 bar. This is also valid for empty bottles used for cleaning cycles.
The bottles must be filled and closed by trained personnel, working under safe conditions. Until they are used, filled bottles must be stored in a locked and marked cupboard, specifically intended for the purpose.

It is important that the correct quantity of formalin is used for sterilization.
Follow the instructions in the OPERATING INSTRUCTIONS.

Training of personnel according to international standard

The person responsible for the activity must arrange for the training of authorised personnel.

The training shall cover the points itemised below:

- The function and safe use of the steriliser.
- The function of the gas sterilisation and safe handling of the sterilisation medium used.
- Health risks, national legislation and ways of detecting leaking gas in the event of an incident.

The training must be logged for each employee and must be repeated at regular intervals.

Error

Should an error occur, due to too high temperature or too high pressure in the chamber, the process ends automatically with an emergency program.
In the event of a fault in the emergency program, an alarm can be generated using the emergency stop push-button.
As a final resort, the chamber must be evacuated using the vacuu pump.

- First, press the stop-button. Pull the stop-button and follow the instructions in *ALARM Sterilizer in progress,* alternative 2.
- If necessary, the evacuation can be done by manually control of the vacuumpump. This is only to be done by trained technicians.

There is a risk for formaldehyde gas coming from the sterilizer chamber, if a door is manually opened

Bowie Dick testing

The purpose of the Bowie Dick test is to reveal deficiencies in the ability of the steriliser to expel air and reveal leaks or an excessive content of non-condensable gases in the steam. In testing in accordance with EN 285, an indicator paper is placed in the centre of a test pack. The pack, which must be 220 - 300 mm square and approx. 250 mm high, must consist of folded cloths of 100% cotton. The pre-treatment of the test programme must be identical to the pre-treatment for the processes used for routine sterilisation, while the sterilisation time may be adapted to the performance of the steriliser but must not exceed 3.5 minutes.

When the indicator paper has been sufficiently exposed to steam at a particular temperature, further exposure tends to hide the indication of any deficiencies. Getinge’s Bowie Dick programme is therefore tested with the shortest possible sterilisation time so that any deficiencies are not concealed by overexposure.

In day-to-day work, the above, standardised test packs for the sake of convenience are sometimes replaced by various types of disposable packs which are manufactured by a large number of manufacturers. As these packs are generally even more sensitive to overexposure than the standardised test pack, it is extremely important to choose the correct make. Test packs in accordance with BS 7720:1995 must be used for Getinge’s Bowie Dick programme.

Approved consumables

Consumables are used for various purposes such as the packing of items to be sterilized, for test purposes, for the replacement of sterilizer parts with limited period of use or as sterilization media in low-temperature sterilization. The list of consumables below is intended as a guide to be used together with Getinge's CE-marked sterilizers.

Always check whether consumables have a use-by date before using them.

Articles for packing items to be sterilized

Packaging materials must be appropriate to the sterilization method, load carrier and the items to be sterilized. To guarantee compatibility with Getinge sterilizers, the user is responsible for packaging materials

and methods used being designed in compliance with European standard EN868-1, the other parts of which also specify special requirements for different types of packaging material.

Packaging material for steam sterilization

Getinge recommends paper packaging for textile packs and for instrument grids in baskets and containers.

Getinge recommends paper/plastic bags for separately packed articles.

Packaging material for formalin or ethylene oxide sterilization

Getinge recommends paper/plastic bags. The use of paper/plastic bags intended for steam sterilization is recommended in formalin sterilization.

Articles for test purposes

The user is responsible for maintaining routine checks on the operation of the sterilizer in accordance with European standard EN554 o EN550, depending on the type of sterilizer. There are various types of test articles on the market to assist the user.

Chemical indicators

Chemical indicators which are used in testing different types of sterilizer must comply with European standard EN867-1, the other parts of which also specify special requirements for different types of indicators.

Getinge recommends using chemical indicators in steam sterilization processes. For other types of processes it the user's responsibility to evaluate whether individual makes are applicable to the Getinge sterilizer process.

An accepted test method in which chemical indicators are used is the Bowie Dick test with a test pack or its equivalent with a single-use pack. For information see also under "Bowie Dick testing".

Biological indicators

Biological indicators which are used in testing different types of autoclave must comply with European standard EN866-1, the other parts of which also specify special requirements for different types of indicators.

Getinge recommends using biological indicators in steam sterilization processes. For other types of the processes it is the user's responsibility

to evaluate whether individual makes are applicable to the Getinge sterilizer process.

Sterilizer parts for periodic replacement

Spare parts
To guarantee operation and product safety, parts for recorders, printers or for periodic maintenance must be genuine Getinge spare parts or parts approved by Getinge After Sales.

The article numbers of genuine parts are specified in the appropriate sections of the service manual.

Sterilization media for low-temperature sterilization with formalin or ethylene oxide sterilizers.
Low-temperature sterilization can only be carried out with special sterilizers intended for the purpose. In the case of sterilization with formalin or ethylene oxide, these media are added from containers which are fitted onto the sterilizer.

Formalin solution
Containers of formalin solution are obtained ready for use and are fitted onto the sterilizer by the operator.

Information on concentration, volume, packing, handling and properties are described where appropriate in the OPERATING INSTRUCTIONS chapter and in the section headed GENERAL HINTS ON FORMALIN STERILIZERS.

Ethylene oxide mixture
Containers of ethylene oxide mixture are obtained ready for use and are fitted onto the sterilizer by specially trained service personnel.

Information on the ethylene oxide mixture and its properties is given where appropriate in the SERVICE MANUAL and in the sectio headed GENERAL HINTS ON ETHYLENE OXIDE STERILIZERS.

HAX093 . . . . . Accessories – MDD

Accessories

The CE marking of the autoclave makes the manufacturer liable for its product safety and function achieving the strict requirements laid down in relevant EC directives. Accessories which are mechanically, electrically or in some other way connected to the autoclave must be compatible with it. Consequently only accessories which have been evaluated

by Getinge AB and have been registered as approved accessories may be used together with the autoclave.

In the event of non-approved accessories being used, Getinge AB does not accept any product liability for the autoclave and its CE marking.

Approved accessories

The accessories enumerated below are only compatible with the autoclave after the autoclave has been configured for them by Getinge AB.

- Expanded operator interfaces which are approved for connection to the autoclave.
  Getinge OPC
  Getinge OPH
  Getinge OP-Win
  Getinge OP-Touch
- Expanded systems for documentation which are approved for connection to the autoclave.
  Getinge Supervisor
  Getinge T-DOQ
  Getinge NOTEase
  Printer Epson LX-300
  Printer Star 8340S
  Printer Star 8340F
- Other external accessories which are approved for docking onto or connection to an autoclave model intended for the purpose.
  Getinge charging equipment for manual loading
  Getingestationary charger ASF
  Getinge sideways-opening charger
  Getinge stand-alone steam generatore
  Getinge degassing tank for feed-water to steam generator
  Getinge compressed-air compressors
  Getinge water-treatment system
  Getinge unloader PULL

JAX086 . . . . . Pre-installation instruction introduction. Ph

This pre-installation instruction covers the information needed to prepare the installation site, before delivery of the unit.

With the delivery of the machine a specific installation instruction will be enclosed. A copy of the specific instruction is also enclosed in the manual.
The specific instruction may also cover details such as:

- Unpacking
- Interbuilding transportation
- Refitting of dismounted equipment
- Functional test prior to use.

JAH004 . . . . . GE sideways-opening

Requirements for the installation site

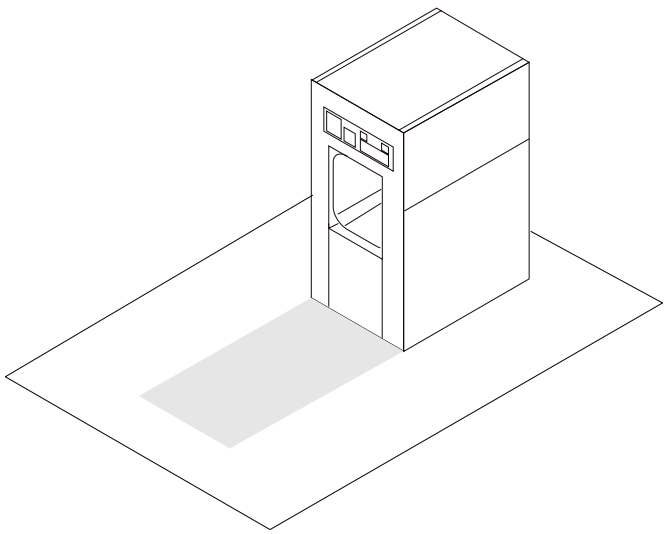
Getinge AB's installation drawings must be used as the basis for dimensions and execution in planning and design. Experience shows that the factors below must be taken into account in particular.

- The autoclave must be set up so that the distance from the nearest workplace or treatment place is greater than 1.5 metres.
- The ceiling height in the service room must be sufficient to allow space for all equipment according to the installation drawing.
- The service room must have good lighting and be ventilated. For requirements regarding ventilation, see the special section on this topic in this instruction manual.
- All dimensions relating to foundations, floor pits, wall openings etc. refer to finished dimensions. These dimensions must be respected when floor, wall and ceiling linings are set up
- Alongside the wall opening for building in an autoclave, there must not be skirting-boards etc. higher than 15 mm within approximately five centimetres from the edge of the opening. If the carpet is continued to the wall, the radius must not be greater than 15 mm within the area indicated above.
- The floor in front of the door(s) of the autoclave must be level and completely horizontal within an area which corresponds at least to the bottom surface of the autoclave chamber. Other requirements such as requirements relating to the load-bearing capacity of the floor are specified in more detail on the installation drawing.

General requirements in respect of the installation site

Use Getinge AB's installation drawings for design and building purposes when determining the necessary dimensions and methods o working. Experience indicates that particular attention should be paid to the following points.

- The sterilizer must be set up so that the distance to the nearest workplace or treatment position is more than 1.5 metres.
- The ceiling height in the service room must be at least 240 cm.
- The service room must have good lighting and be ventilated. For further details of ventilation requirements, see the special section in these instructions.
- All dimensions of foundations, floor pits, wall openings etc. are finished dimensions, and must be met when floor, wall and ceiling covering materials have been applied.
- Within a distance of about 5cm from the edge of the opening in which the sterilizer is to be installed, there must be no skirting boards or similar strips etc. that are more tha n 15mm high. If the floor covering is turned up along the bottom edge of the wall, its radius must not exceed 15mm within the above-defined area.



- The floor in front of the sterilizer's door/doors must be flat and level within in a zone as shown in the diagram above. When installing several sterilizers that are to be served by a common loader, the width of this area must be the same as that of the entire installation. These requirements, and others such as those relating to floor loading, are specified in more detail on the installation drawing.

- Sterilizers installed in wall openings should be sealed to the wall in order to separate the sterile and non-sterile sides. Getinge AB markets an ancillary system that covers the wall opening. If this is not used, the edges of the opening must be smoothed off and enclosed in a hygienically appropriate manner.

JAX023 . . . . . Unpacking.

Find out the central point of gravity when lifting and transporting a packed or not packed sterilizer thereby avoiding serious accidents.

Unpacking

- Check when unpacking the apparatus that the order No. of its data plate conforms with the ordering No. of the documents.
- Check that the sterilizer is faultless. Any transportation damage should be reported within seven days to the transport company that was responsible for delivery.
- Do not remove the protective plastic film from stainless steel panels until the installation is completed.
- There is certain equipment such as expendable items, control unit, operating instruction and list of programs by-packed the sterilizer inside the chamber. The two latter are to be posted where easily observed by the operator at work.

Please note that those articles are adapted for each sterilizer. When unpacking more than one sterilizer the articles are not to be interchanged.

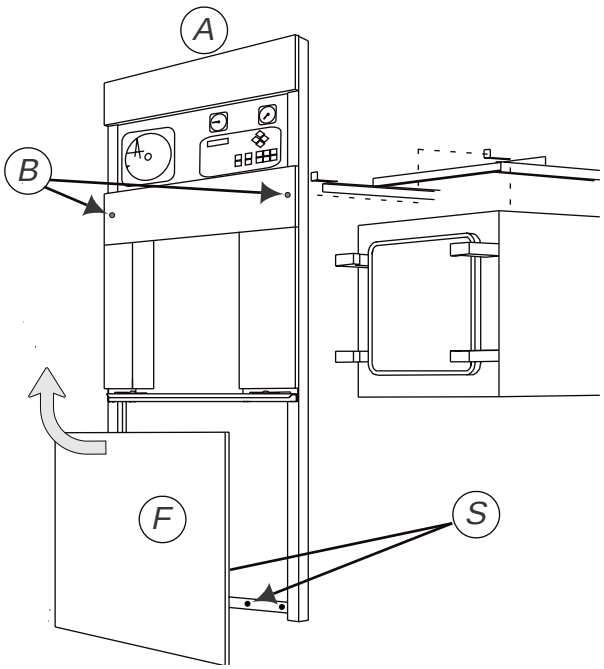
JAM005 . . . . . Sterilizer with manually operated door

Interbuilding transportation

The lowest part of the sterilizer stand has a floor clearance of 100 mm. This is to enable for the sterilizer to be transported by a fork lift attaching from either the left or the right hand side after the side plates have been removed.

If a front- or rear panel has to be removed in order to gain access, most appropriate with recessed type of sterilizers, the work should be carried out as described below in order not to spoil the alignment plate / sterilizer.

1. Remove the top plate and all side cover plates.
2. Thread off the aluminium button below the door opening.
3. Remove the plate below door opening “F” by pulling the top edge straight out, then lifting it.
4. Loosen pipe- and electric connections to the front panel components
5. Most of the front trim plates are assembled in a fixture and should not be separated. Dismantle the whole front unit assembly “A” unscrewing the four nuts “B” at the rear of the front plate and the screws “S”.
6. Assemble in reverse order.



JAX071 . . . . . Internal transport, GE 206. Not SPF.

Internal transport

Does not apply to SPF sterilizers

The lower frame of the sterilizer has a floor clearance of 100mm, allowing the sterilizer to be lifted by a forklift truck from either side after the side panels have been removed.

When transporting the sterilizer through doors, along narrow passages or when it is to be positioned into its wall opening, it must be carried

longitudinally. The most suitable way of doing this is to lift it by a pallet truck from the front and/or back.

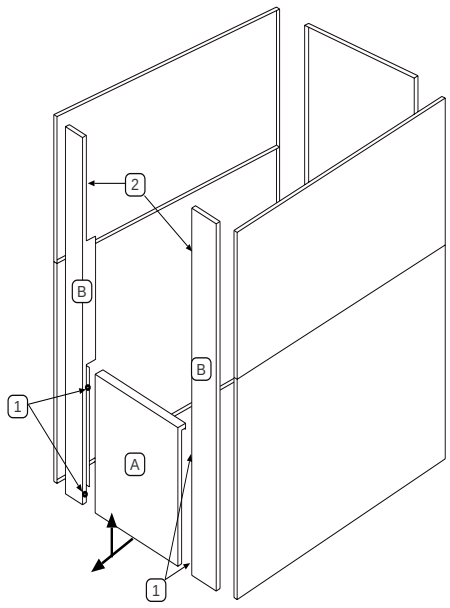
When lifting the unit from its short side, panel 'A' must first be removed: see item 2 below.
Never lift the unit using the lower bracket of the door operating cylinder.

Lift the sterilizer so that the load is supported on the cross-beam 205 mm behind the front of the unit, and nowhere else. The minimum necessary ceiling height to allow the sterilizer to pass is 202 cm.
The method of lifting the sterilizer from its short sides is recommended when it is to be positioned in a wall opening.

On certain models, the electrical cubicles are fitted perpendicular to the chamber. If side panel “B” behind the electrical cubicle, the outer vertical mount and a cross-brace beneath the cubicle are removed, the electrical cubicle can be hinged out behind the sterilizer to reduce its width.

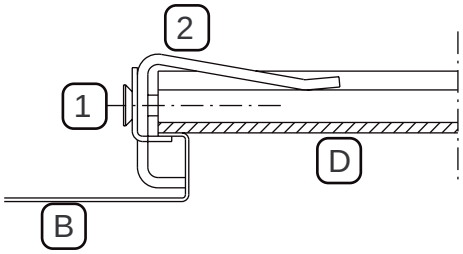
If it is necessary to remove a front or rear panel in order to improve accessibility, this must be done as described below in order to avoid disturbing any settings.

1. Remove any top panel and side panels.
2. Remove panel “A” by first pulling its lower edge outwards and then lifting it straight up.



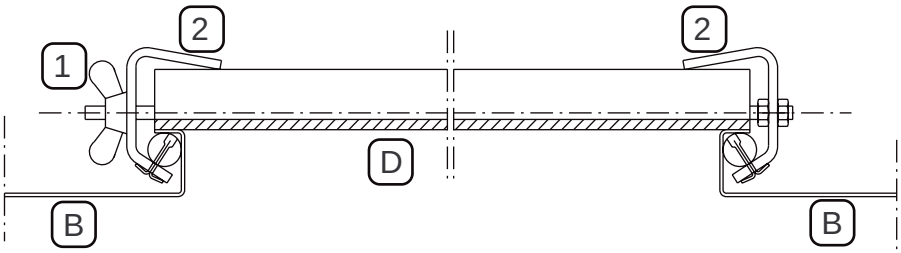
3. Remove the four bolts “1” and secure the side panels to the sterilizer frame.
4. Slacken the upper mounts of the side panels as appropriate, depending on whether the sterilizer is fitted with a top plate and side panels or not.

Access from both sides for sterilizers with side panels and top plate:



- Unscrew bolt “1” sufficiently to allow clamp “2” to be pulled far enough to the right to release the “B” edge of the side panel. Remove the front panel.

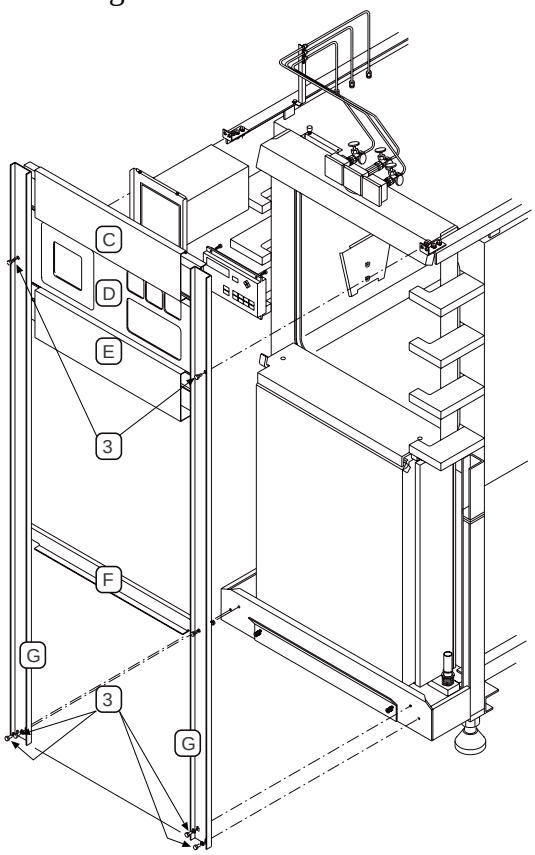
Access from one side with other types:



- Release wing nut “1” sufficiently to allow the right-hand clamp “2” to be pulled over to the right with the pull rod sufficiently to allow the “B” edge of the side panel to be released. Remove the front panel.
- Pull the pull rod and clamp sufficiently far over to the left to allow the left-hand front panel to be removed.

5. Disconnect pipe and electrical connections to the instrument panel (“D”) components.
6. Parts “C”, “D”, “E”, “F” and “G” are, together with the frame that holds them, assembled in a frame and must not be dismantled. Mark

out its position on the sterilizer and remove the entire unit in one piece by removing bolts “3”.



7. Remove the rear panel on single-door sterilizers by removing the upper and lower securing bolts.
8. Re-assemble in the reverse order.

JAH005 . . . . . Sideways-opening door Autoclave 69x NOT SPF

Internal transport

Does not apply to SPF autoclaves

The autoclave must if possible be lifted by the lifting eyes located on the outside of the chamber. Where this is not possible, it may be lifted by a fork-lift truck which grips the lower support frame from the side. If the truck has adjustable forks, these must be moved apart as much as possible. When autoclaves with a chamber depth greater than 1250 mm are being lifted, a beam is placed on the forks to help distribute the load over a larger area of the support. When being transported through doors or through narrow passages or being installed in the wall opening, the autoclave must be transported longitudinally. A suitable way of lifting the autoclave is with a pallet lifter from the front and rear. The lifting must be done in the cross-beam of the support and must not be done anywhere else. The method of lifting the autoclave from the short side is recommended when the apparatus is to be installed in a wall opening.

Alternatively the apparatus can be transported by positioning 'roller-skates' underneath the support legs and rolling the autoclave into position.

If the door lintel at the time of delivery is fitted on the chamber and has to be disassembled for internal transport, this can be done as follows:

- Loosen the four retaining screws underneath the door lintel.
- Pull the door lintel sideways out of the ball bushings in which the door is suspended.

When the autoclave is in position, re-fit the door lintel in the reverse sequence.

JAH006 . . . . . Sideways-opening door Autoclaves >69x

Internal transport

It is recommended that a transport firm experienced in dealing with heavy lifting should be appointed when the autoclave is to be transported to its intended position.

The autoclave must if possible be lifted by the lifting eyes on the top of the chamber. Where this is not possible, it may be lifted with a jack using the four brackets welded into the sides of the chamber slightly above the bottom of the chamber. The autoclave is transported by placing 'roller-skates' underneath the chamber legs and rolling the autoclave into position.

If the door lintel at the time of delivery is fitted on the chamber and has to be disassembled for internal transport, this can be done as follows:

- Loosen the four retaining screws underneath the door lintel.
- Pull the door lintel sideways out of the ball bushings in which the door is suspended.

When the autoclave is in position, re-fit the door lintel in the reverse sequence.

JAX024 . . . . . General. Sterilizer 69X or smaller

Storage

The sterilizer should be stored in a temperature between 2 and 40 °C and at a maximum relative humidity 95% (not condensating).

Installation

- Place the sterilizer close to but never over a drain. Leave a well sized clearance space on both sides for good operation and easy and safe maintenance of the equipment. The back of the sterilizer may if necessary come up close to a wall. See also appropriate diagrams and drawings.
- Arrange for escape distances, as directed from labour safety point of view, to be contained.
- Place stainless steel floor pads under each levelling leg to protect the floor. Adjust the legs to make the loading height fall within specified dimension, while checking by means of a spirit level that the sterilizer chamber bottom is horizontal.

Connection

Certain installation works should be carried out by authorized technicians. This is specially the case when it comes to electricity and water.
Faulty accomplished installation may jeopardize the safety to person and property and invalidates manufacturer's warranty on the equipment.

Piping and electrical wiring should be made in a neat manner to make the service compartment look workman like.

- Find out the connection points and connection data of the steriliser by studying the installation drawings.
- Pay attention to local regulations.
- Remove impurities by blowing through all pipes to be connected to the sterilizer.
- Insulate hot pipes.
- Mark pipes and electrical leads.

Install shut-off valves in the supply lines near the equipment so as to avoid passing risk areas when using these. The deeper part of the service compartment is therefore not a suitable place.

Storage

The sterilizer should be stored in a temperature between 2 and 40 °C and at a maximum relative humidity 95% (not condensating).

Installation

- Place the sterilizer close to but never over a drain. Leave a well sized clearance space on both sides for good operation and easy and safe maintenance of the equipment. The back of the sterilizer may if necessary come up close to a wall. See also appropriate diagrams and drawings.
- Arrange for escape distances, as directed from labour safety point of view, to be contained.
- Replace the bolts that served as feet during transport with the feet supplied with the unit (delivered in the chamber).
- Adjust the legs so that the bottom of the chamber is level in both dimensions, checking at the same time that the prescribed loader height is maintained. See also the instructions on the installation drawing for the particular sterilizer concerned.

Connection

Certain installation works should be carried out by authorized technicians. This is specially the case when it comes to electricity and water.
Faulty accomplished installation may jeopardize the safety to person and property and invalidates manufacturer's warranty on the equipment.

Piping and electrical wiring should be made in a neat manner to make the service compartment look workman like.

- Find out the connection points and connection data of the steriliser by studying the installation drawings.
- Pay attention to local regulations.

- Remove impurities by blowing through all pipes to be connected to the sterilizer.
- Insulate hot pipes.
- Mark pipes and electrical leads.

Install shut-off valves in the supply lines near the equipment so as to avoid passing risk areas when using these. The deeper part of the service compartment is therefore not a suitable place.

Storage

The autoclave must be stored at a temperature between 2 and 40°C and a relative humidity of max. 95% (non-condensing).

Installation

- Set up the autoclave close to but never over a floor drain so that a user-friendly service space at least 0.8 m wide is obtained on the service side. The rear (single-door autoclave) and the other long side can be positioned alongside a wall, but there should preferably be working space here too. See also diagrams and drawings.
- Make sure that the escape distances required under industrial-safety regulations are respected.
- Place the stainless-steel square washers supplied (in the autoclave chamber) beneath the legs of the apparatus.
- Adjust the legs so that the chamber bottom is horizontal both in depth and sideways. Check at the same time that the autoclave has the specified charging height. See also the instructions on the installation drawing of the autoclave.

Connection

**Some installation jobs, e.g. electrical and water installations, must be carried out by a qualified person.
Incorrectly performed work may result in personal injury and damage to property.
Faulty installation work invalidates the warranty on the product supplied.**

Pipes and electrical leads must be routed in a professional way so that the service space has a pleasant appearance and at the same time represents a practical and safe workplace.

- Find out about the connection points and connection data of the autoclave by studying the installation drawings.
- Comply with local regulations.
- Flush or blow clean the lines to which the autoclave is to be connected.
- Insulate both hot and very cold pipes.
- Mark pipes and electrical leads.

Position shut-off valves for all supply media alongside the autoclave concerned so that the operator can shut off the supply without emergency gas entering a hazard zone. The shut-off valves should therefore not be located in the inner part of the service space.

JAH009 . . . . . General. Autoclaves >69x???

Storage

The autoclave must be stored at a temperature between 2 and 40°C and a relative humidity of max. 95% (non-condensing).

Installation

- Set up the autoclave close to but never over a floor drain so that a user-friendly service space at least 0.8 m wide is obtained on the service side. The rear (single-door autoclave) and the other long side

can be positioned alongside a wall, but there should preferably be working space here too. See also diagrams and drawings.

- Make sure that the escape distances required under industrial-safety regulations are respected.
- Adjust the legs so that the chamber bottom is horizontal both in depth and sideways. Check at the same time that the autoclave has the specified charging height. See also the instructions on the installation drawing of the autoclave.

Connection

Some installation jobs, e.g. electrical and water installations, must be carried out by a qualified person.
Incorrectly performed work may result in personal injury and damage to property.
Faulty installation work invalidates the warranty on the product supplied.

Pipes and electrical leads must be routed in a professional way so that the service space has a pleasant appearance and at the same time represents a practical and safe workplace.

- Find out about the connection points and connection data of the autoclave by studying the installation drawings.
- Comply with local regulations.
- Flush or blow clean the lines to which the autoclave is to be connected.
- Insulate both hot and very cold pipes.
- Mark pipes and electrical leads.

Position shut-off valves for all supply media alongside the autoclave concerned so that the operator can shut off the supply without emergency gas entering a hazard zone. The shut-off valves should therefore not be located in the inner part of the service space.

JAX050 . . . . . GEE, Ex-version

Premises

The sterilizer must be placed in an area which is designed regarding explosion hazard

JAX051 . . . . . GEE, NOT Ex-version

Premises

JAX052 . . . . . GEE, General

Premises intended for ethylene sterilization should be well ventilated according to instructions under the headings Installation, Connection and Ventilation in this instruction.

Gas sterilizers must be located in a room having at least 10 air changes per hour in the direction from ceiling towards the floor. The same rules valid for the gas bottle storage room.

The room should be used exclusively for sterilisation purposes and must not be used as a general working place or as pause room for the personnel.

The room ventilation should be connected with the sterilizer control system so as to block the start of a sterilisation process in case the room ventilation is not working.

Access doors to the area, as well as the area itself, shall be marked with warning signs.
Below is an example of such a sign:

WARNING

Ethylene oxide

Only authorised personnel admitted

Storage

The sterilizer should be stored in a temperature between 2 and 40 °C and at a maximum relative humidity 95% (not condensating).

Installation

- Place the sterilizer close to but never over a drain. Leave a well sized clearance space on both sides for good operation and easy and safe maintenance of the equipment. The back of the sterilizer may if necessary come up close to a wall. See also appropriate diagrams and drawings.
- Arrange for escape distances, as directed from labour safety point of view, to be contained.
- Adjust the loading height of the chamber by placing stainless steel shims under the support beams. The number of shims will be dependant on the allowed concentrated loads on the floor. When calculating the load consideration must be taken to pressure test of the chamber, when the chamber will be filled with water.
  When adjusting the loading height, check that the sterilizer chamber bottom is horizontal. The check should be done by means of a spirit level. If necessary adjust with shims.
- Bolt the chamber to the floor, using two bolt-holes on the support beams (one on right side and one on left side of the chamber).

Connection

Certain installation works should be carried out by authorized technicians. This is specially the case when it comes to electricity and water.
Faulty accomplished installation may jeopardize the safety to person and property and invalidates manufacturer's warranty on the equipment.

Piping and electrical wiring should be made in a neat manner to make the service compartment look workman like.

- Find out the connection points and connection data of the steriliser by studying the installation drawings.
- Pay attention to local regulations.
- Remove impurities by blowing through all pipes to be connected to the sterilizer.
- Insulate hot pipes.
- Mark pipes and electrical leads.

Install shut-off valves in the supply lines near the equipment so as to avoid passing risk areas when using these. The deeper part of the service compartment is therefore not a suitable place.

JAX035 . . . . . General. Ph division (> 69x)

Storage

The sterilizer should be stored in a temperature between 2 and 40 °C and at a maximum relative humidity 95% (not condensating).

Installation

- Place the sterilizer close to but never over a drain. Leave a well sized clearance space on both sides for good operation and easy and safe maintenance of the equipment. The back of the sterilizer may if necessary come up close to a wall. See also appropriate diagrams and drawings.
- Arrange for escape distances, as directed from labour safety point of view, to be contained.
- Adjust the legs to make the loading height fall within specified dimension, while checking by means of a spirit level that the sterilizer chamber bottom is horizontal.

Connection

Certain installation works should be carried out by authorized technicians. This is specially the case when it comes to electricity and water.
Faulty accomplished installation may jeopardize the safety to person and property and invalidates manufacturer's warranty on the equipment.

Piping and electrical wiring should be made in a neat manner to make the service compartment look workman like.

- Find out the connection points and connection data of the steriliser by studying the installation drawings.
- Pay attention to local regulations.
- Remove impurities by blowing through all pipes to be connected to the sterilizer.
- Insulate hot pipes.
- Mark pipes and electrical leads.

Install shut-off valves in the supply lines near the equipment so as to avoid passing risk areas when using these. The deeper part of the service compartment is therefore not a suitable place.

JAX087 . . . . . Pre-Installation instruction

Storage

The sterilizer should be stored in a temperature between 2 and 40°C and at a maximum relative humidity 95% (not condensating).

Installation

- Place the sterilizer close but never over a drain. Leave a well sized clearance space on both sides for good operation and easy and safe maintenance of the equipment. The back of the sterilizer may if necessary come up close to a wall. See also appropriate diagrams and drawings.

- Arrange for escape distance, as directed from labour safety point of view, to be contained.

Connection

Certain installation works should be carried out by authorized technicians. This is specially the case when it comes to electricity and water.
Faulty accomplished installation may jeopardize the safety to person and property and invalidates manufacturer´s warranty on the equipment.

Piping and electrical wiring should be made in a neat manner to make the service compartment look workman like.

- Find out the connection points and connection data of the sterilizer by studying the installation drawing.
- Pay attention to local regulations.
- Remove impurities by blowing through all pipes to be connected to the sterilizer.
- Insulate hot pipes.
- Mark pipes and electrical leads.

Install shut-off valves in the supply lines near the equipment so as to avoid passing risk areas when using these.The deeper part of the service compartment is therefore not a suitable place.

Refitting of disassembled autoclave

IMPORTANT: If the conditions for installation and refitting of the autoclave are not fulfilled, Getinge AB's product liability and any CE marking cease to apply.

If the autoclave is too large to be taken into the installation site, the autoclave must be partially disassembled in the factory prior to delivery. This means that disassembled parts must be assembled at the installation site. Door assembly is described in a separate section, while other parts are dealt with below.

Getinge AB only accepts manufacturer's liability for the product and any CE marking if the autoclave is installed entirely in accordance with the attached installation instructions and if the conditions enumerated below have been fulfilled.

- All refitting must be carried out by personnel who have received training on the type of apparatus concerned from Getinge AB.
- The refitting should be based on the documentation in the form of photographs attached to the autoclave.
- Indicated pipe and electrical components must be refitted using the marking at the connection points and applicable diagrams.
- Refitted pipes must be insulated in accordance with attached instructions. Necessary insulation material is supplied with the autoclave.

JAH001 . . . . . Reassembly of door

JAH003 . . . . . Reassembly of door

Refitting of door

Because of the low driving force, it is important that the door is correctly suspended to enable it to travel between the end points without any friction other than that caused by the supporting ball bushings. Prior to the measures below, it is presupposed that the sterilizer is installed according to valid installation instructions.

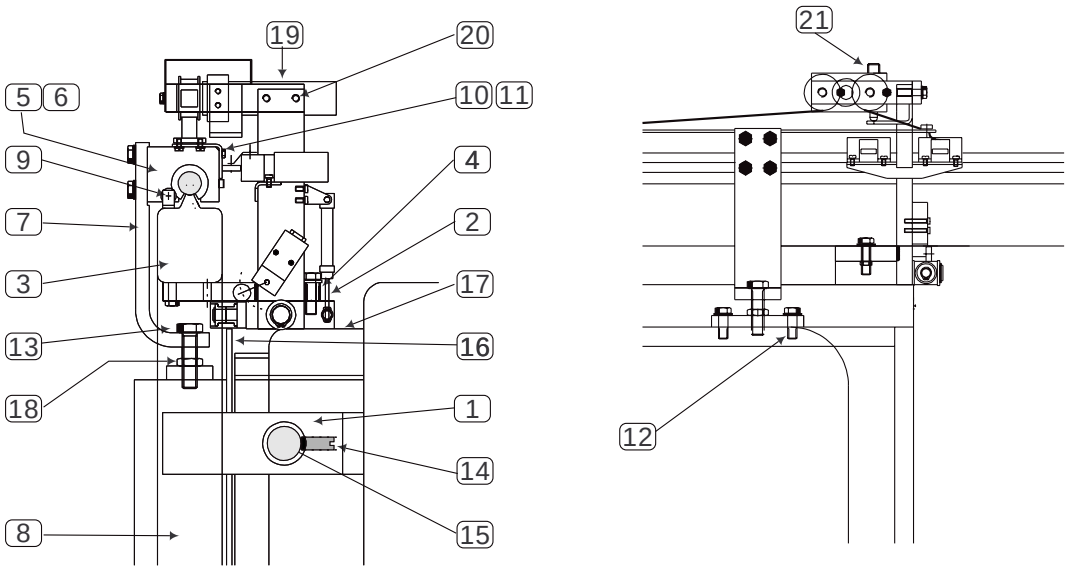
When the door beam is removed.

A Lift the beam (3) on to the beam holders (2) and fix it with the screws.

B Attach the support brackets (7) in the bushing housing (6). Check that the upper fixed shoulder of the bracket comes close to the machined upper end of the bushing housing.

C Mount the pole underneath the beam. Only applicable for sterilizers with door openings other than 660 x 920 or 900 x 900.

D Fit the timing belt at each end of the bush connection somewhat slackened so as to enable for the pneumatic motor to overcome its static friction when starting up, without moving the heavy door.



General

DO NOT remove the transportation securing iron until the points A-C above has been carried out and inspected!

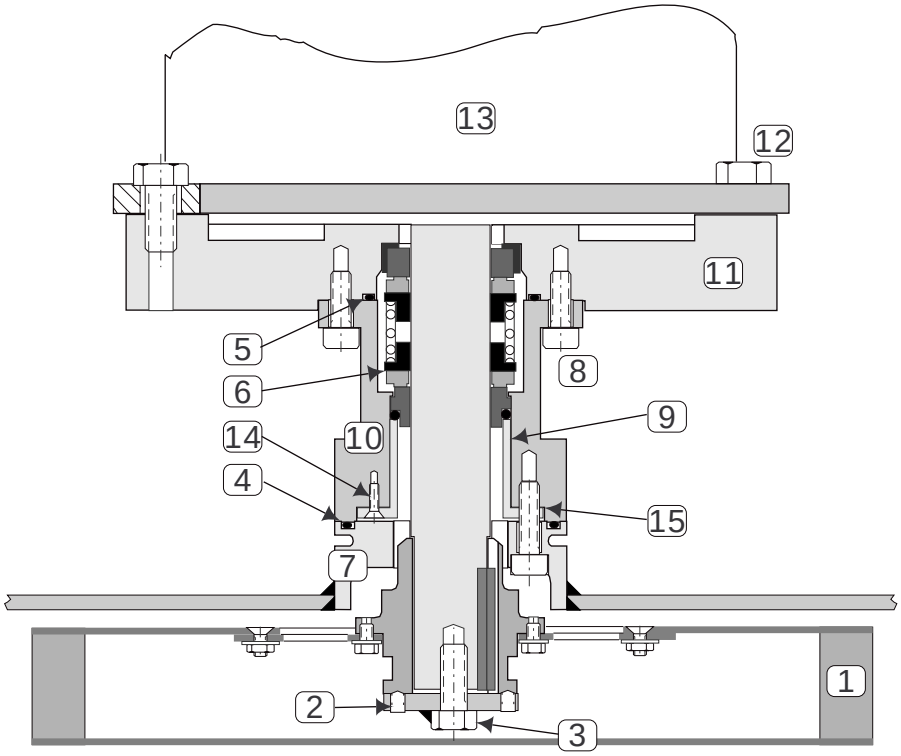
- Remove the transportation securing iron at the side of the door.
- Lift the door without using the support screws (13) in order not to alter the height adjustment and remove the transportation spacers.
- Lower the door.
- Check the horizontal position of the door beam.
- If the beam is not horizontal the chamber might not be correctly levelled. The level of the beam can be adjusted with the adjusting screws (4). Before adjusting, reduce the load on the beam by lifting the door. Make sure, while adjusting, that the beam is not moving in any undesired direction.

- Check the height position of the door. When correct, the adjustment screws (14) of the door bolts should hit the bolts (15) on their central line. Adjust, if necessary, with the screws (13).
- Check f the safety action limit switch.
  - **Closed door**: Check that the gap between the bush connector (10) and the roller on the switch is 2 - 3 mm when the limit switch is changing over. Check while the door is slowly closing that the limit switch changes over when the door is 5 mm, or less, away from being completely closed.
- Check that the distance between door plane and seal groove is the same all around the door. If not, the chamber might not be correctly levelled. The door can be adjusted by slackening the door holder (12) attachment screws and adjust the door holder in it's oval holes so that the door plane is vertical. The door cover plate should be mounted during this operation.
- Loosen the timing belt at the motor end and mount the motor unit (19) by using the screws (20). Place as shown on drawing above.
- Fit the timing belt somewhat slackened so as to enable for the pneumatic motor to overcome its static friction when starting up, without moving the heavy door.
- Pneumatic motor:
  The closing force must, according to IEC 1010-2-41, not exceed 150 N. The Getinge door system complies with this regulation as delivered.
  Use the screw (21) to adjust the tension of the spring supported motor suspension so that the valve closes the compressed air to the motor when the closing movement is obstructed.
  NOTE: Too low spring tension will cause the door to stop unnecessarily.

Fitting a fan unit

Where the sterilizer comes with fan motors and fans, the units are removed and refitted as follows:

When fitting fan motor and fan, bear in mind the weight of the components. The weight of the motor is stated on the installation drawing.



- Fit the O-ring (4) in the groove on the fan spigot.
- Mount the fan unit on the chamber and secure it with the screws (15) from inside the chamber.
- Fit the fan impeller (1) and the locking belt (2).
- Attach fixing part (03) (roll pin or locking screw)
  Note: The fan may be hard to turn even with the O-ring correctly fitted
- Connect the inlet and outlet of the sealing water, and the drain connection.
- Connect the electrical cables to the motor.

JAX063... . . . . . GEV, 900 fan

The impeller weighs about 8 kg.

The impeller weighs about 25 kg.

Electricity

Before welding on or near-by the sterilizer, the boards of the control system has to be isolated!
Disconnect all plug in connectors from all PCBs!

The electric components of the control unit will tolerate supply line voltage variations of ±10%. Greater fluctuations demand for a voltage stabilizer to be introduced between the sterilizer automatic fuse and the control equipment. As the latter will cause inductive load on the stabilizer this should be well oversized (minimum 500 VA). The frequency deviation may amount to ±1%.

- Check that all electric wire connection screws are tightened.

Connect the sterilizer to an electric 50 Hz supply line, with 3 x 380-400 volts (+ neutral) + protective earth, through a closely situated isolator.

The stated voltage is for the standard version of the sterilizer. Check on the installation drawing and the drawing with technical data which voltage and frequency the unit is built for. Those documents also give information about power and fuse ratings that may be important for choosing the correct size of cables.

- If the building where the sterilizer is installed has a separate equipotential ground line, a wire must be run from this to the grounding terminal of the surge protection. The surge protection is in the terminal box. See the electrical diagram.

Not until the feed water tank is filled with water, check by a brief manual operation of the direct on line starter of the vacuum pump, that the

direction of rotation conforms with the arrow on the pump housing.

Running the shaft seal dry may destroy it in a few seconds.

Change any two of the main supply wires on their connection terminal to reverse the direction of rotation.

JAX067 . . . . . Electricity. GE-units. TN-system.

Electricity

Before welding on or near-by the sterilizer, the boards of the control system has to be isolated!
Disconnect all plug in connectors from all PCBs!

The electric components of the control unit will tolerate supply line voltage variations of ±10%. Greater fluctuations demand for a voltage stabilizer to be introduced between the sterilizer automatic fuse and the control equipment. As the latter will cause inductive load on the stabilizer this should be well oversized (minimum 500 VA). The frequency deviation may amount to ±1%.

- Check that all electric wire connection screws are tightened.

Connect the sterilizer to an electric 50 Hz supply line, with 3 x 380-400 volts (+ neutral) + protective earth (TN-S system), through a closely situated isolator.

The stated voltage is for the standard version of the sterilizer. Check on the installation drawing and the drawing with technical data which voltage and frequency the unit is built for. Those documents also give information about power and fuse ratings that may be important for choosing the correct size of cables.
If the 3-phase system is other then TN-S, Getinge AB must be informed in advance. An other 3-phase-system can destroy the electronic equipment if wrongly designed.

- If the building where the sterilizer is installed has a separate equipotential ground line, a wire must be run from this to the grounding

terminal of the surge protection. The surge protection is in the terminal box. See the electrical diagram.

Not until the feed water tank is filled with water, check by a brief manual operation of the direct on line starter of the vacuum pump, that the direction of rotation conforms with the arrow on the pump housing.

Running the shaft seal dry may destroy it in a few seconds.

Change any two of the main supply wires on their connection terminal to reverse the direction of rotation.

JAX053 . . . . . Equipotential ground line (GEE)

The unit is designed for installation in explosion-hazardous area. Therefore a equipotential ground line must be available. See further information in the separate EX-documentation

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JAX048 . . . . . Electricity, Other than GE-units

Electricity

Before welding on or near-by the sterilizer, the boards of the control system has to be isolated!
Disconnect all plug in connectors from all PCBs!

The electric components of the control unit will tolerate supply line voltage variations of ±10%. Greater fluctuations demand for a voltage stabilizer to be introduced between the sterilizer automatic fuse and the control equipment. As the latter will cause inductive load on the stabilizer this should be well oversized (minimum 500 VA). The frequency deviation may amount to ±1%.

- Check that all electric wire connection screws are tightened.

Connect the sterilizer to an electric 50 Hz supply line, with 3 x 380-400 volts (+ neutral) + protective earth, through a closely situated isolator.

The stated voltage is for the standard version of the sterilizer. Check on the installation drawing and the drawing with technical data which voltage and frequency the unit is built for. Those documents also give information about power and fuse ratings that may be important for choosing the correct size of cables.

- If the building where the sterilizer is installed has a separate equipotential ground line, a wire must be run from this to the grounding terminal of the surge protection. The surge protection is in the terminal box. See the electrical diagram.

JAX114 . . . . . Electricity, Other than GE-units. TN-system.

Electricity

Before welding on or near-by the sterilizer, the boards of the control system has to be isolated!
Disconnect all plug in connectors from all PCBs!

The electric components of the control unit will tolerate supply line voltage variations of ±10%. Greater fluctuations demand for a voltage stabilizer to be introduced between the sterilizer automatic fuse and the control equipment. As the latter will cause inductive load on the stabilizer this should be well oversized (minimum 500 VA). The frequency deviation may amount to ±1%.

- Check that all electric wire connection screws are tightened.

Connect the sterilizer to an electric 50 Hz supply line, with 3 x 380-400 volts (+ neutral) + protective earth (TN-S system), through a closely situated isolator.

The stated voltage is for the standard version of the sterilizer. Check on the installation drawing and the drawing with technical data which voltage and frequency the unit is built for. Those documents also give information about power and fuse ratings that may be important for choosing the correct size of cables.
If the 3-phase system is other then TN-S, Getinge AB must be informed in advance. An other 3-phase-system can destroy the electronic equipment if wrongly designed.

- If the building where the sterilizer is installed has a separate equipotential ground line, a wire must be run from this to the grounding terminal of the surge protection. The surge protection is in the terminal box. See the electrical diagram.

- If the sterilizer is to be connected to an independent computer, e.g. containing programs for OPH or OPC, the supply to the computer should be taken from the same switchboard as that to which the sterilizer is connected.
- It is recommended that the three-phase supply should be protected by an RCD with a 3 0 0mA trip current.
- The supply cable to the sterilizer should be run so that the temperature rise in the cable due to its insulation and ambient temperature remains within permissible limits.
- The supply cable shall be connected to such a source, and be appropriately protected by fuses, such that the sterilizer cannot be subjected to short-circuit currents exceeding 6kA.
- Load-breaking switches in accordance with IEC 898, with gG or gM characteristic, are recommended for circuit protection. If such switches are not available, protection can be provided by IEC 269-1 fuses, characteristics B or C.

Electricity

Before welding on or near-by the sterilizer, the boards of the control system has to be isolated!
Disconnect all plug in connectors from all PCBs!

The electric components of the control unit will tolerate supply line voltage variations of +5 -10%. Greater fluctuations demand for a voltage stabilizer to be introduced between the sterilizer automatic fuse and the control equipment. As the latter will cause inductive load on the stabilizer this should be well oversized (minimum 500 VA). The frequency deviation may amount to ±1%.

- Check that all electric wire connection screws are tightened.

Connect the sterilizer through a nearby multi-pole lockable switch to a 3-phase supply with non-disconnectible earth continuity conductor. See the power ratings in the following table(s) for details of fuse ratings and wire sizes.

In the apparatus specification in the service manual, check the voltage and frequency for which the equipment is designed.

- If the building where the sterilizer is installed has a separate equipotential ground line, a wire must be run from this to the grounding terminal of the surge protection. The surge protection is in the terminal box. See the electrical diagram.
- If the sterilizer is to be connected to an independent computer, e.g. containing programs for OPH, OPC or DOQ, the supply to the computer should be taken from the same switchboard as that to which the sterilizer is connected.
- It is recommended that the three-phase supply should be protected by an RCD with a 3 0 0mA trip current.
- The supply cable to the sterilizer should be run so that the temperature rise in the cable due to its insulation and ambient temperature remains within permissible limits.
- The supply cable shall be connected to such a source, and be appropriately protected by fuses, such that the sterilizer cannot be subjected to short-circuit currents exceeding 6kA.

- Load-breaking switches in accordance with IEC 898, with gG or gM characteristic, are recommended for circuit protection. If such switches are not available, protection can be provided by IEC 269-1 fuses, characteristics B or C.
- If the vacuum pump is to be placed in a separate area away from the sterilizer servicing area, it must be provided with its own all-pole, lockable and safety-marked switch. The switch must be in the immediate vicinity of the pump.

JAX121 . . . . . ESD on installation general

ESD (Electrostatic discharge)

ESD damage in installation and servicing may destroy the electronic equipment. Read the instructions below BEFORE starting work.

ESD damage

ESD is an overall term describing how electronic circuits are damaged by the static charging to which they are exposed when they come into contact with electrically charged objects. Virtually all non-earthed objects in the world around us have a static charge. Equipment and people are imperceptibly charged by friction in the air or between shoes and floor in ordinary walking. This charge is transferred to the electronic circuits when they are touched.

Any damage that occurs to the electronics may be difficult to detect and trace. It varies from immediate destruction of a circuit so that it no longer works at all to insidiously affecting operation so that performance is not maintained. The circuits may even appear to be undamaged and then later disintegrate inexplicably.

Most replacements of electronic boards where the fault cannot be explained and is blamed on uneven quality are probably due to ESD damage.

Requirements for protection in installation and servicing

Getinge AB has ESD protection integrated into the production and testing of electronic equipment and also requires ESD protection to be used after delivery for the warranty to apply.

Damage usually occurs after delivery if electronic boards are stored in non-ESD-approved packs, if electronic boards are placed on non-ESD-protected work surfaces or if people not wearing ESD protection touch

them. Simple equipment can be obtained for all these situations which prevents charging and therefore ESD damage. Contact your local distributor of ESD protective equipment or Getinge After Sales.

Practical requirements

- Keep electronic boards only in screened and ESD-approved (marked) bags.
- Use ESD pads connected to earth in accordance with the manufacturer's instructions to hold disassembled or new electronic boards during assembly work.
- Do not touch electronic boards with tools that may be charged, e.g. screwdrivers with a plastic or wooden handle. Use earthed tools if necessary.
- Always use an ESD wrist band connected to earth in accordance with the manufacturer's instructions when working in the electronic enclosure or when handling boards.
- Newer keep foreign objects such as drawings or plastic pockets inside the electronic box.
- Test the ESD protective equipment regularly.

JAX074 . . . . . Connection data, GE 2066. Central steam supply

Connection data

Mains voltage V	380 - 400	380 - 400	415	220 - 255	220 - 255
Frequency Hz	50	60	50	50	60
Fuse rating A	16	16	16	16	20
Max.terminal area mm2	4	4	4	4	4

JAX116 . . . . . Connection data, GE 2066. Central steam supply

Connection data

Mains voltage V	380 - 400		380 — 400	415		220 — 255	220 — 255
Frequency Hz	LEM50	LEM90	All	LEM50	LEM90	All	Alla
Fuse rating A	50	50	60	50	50	50	60
Max.terminal area mm2	10	16	16	10	16	16	20

JAA012 . . . . . Connection requirements for 380-440 V E-type sterilizers. Hospital

Connection data

Load, kW	19		30	40	50	60
Supply voltage, V	380 - 440	220 - 255	380 - 440	380 - 440	380 - 440	380 - 440
Fuse rating, A	32	63	50	80	100	100
Max. cable size, mm^2	16	16	16	35	35	35
RCD trip current, mA	300	300	300	300	300	300

JAA015 . . . . . Connection requirements for 380-440 V E-type sterilizers. Hospital

Connection data

Load, kW	19		30	40	50	60
Supply voltage, V	380 - 440	220 - 255	380 - 440	380 - 440	380 - 440	380 - 440
Fuse rating, A	40	63	50	80	100	100
Max. cable size, mm^2	16	16	16	35	35	35
RCD trip current, mA	300	300	300	300	300	300

JAH007 . . . . . . Electrical data. Introduction to A-model or stand-alone steam generator, Hospital

Connection data

Mains voltageV	220 - 230
Pump modell	LEM250
Frequency Hz	50
Fuse A	25
Max. connection area mm^2	6

JAA013 . . . . . . Connection requirements for E-type 38 kW sterilizers. Hospital

- If the sterilizer is to be supplied from a 220-255 V supply, connection is split between two groups in order not to exceed the 100 A fuse rating. The two connection points are clearly marked, with indication of their fuse ratings.
- It is recommended that both three-phase groups are switched via a common safety switch.

Connection data

Sterilizer type:	GE 2606 - 2612 standard		GE 2606 - 2612 with external vacuum pump		GE 2617 - 2618	
Connection group	1	2	1	2	1	2
Load, kW	2,5*1 3,5*2	39	3,5*1 5,0*2	39	29	38
Supply voltage, V	220 - 255	220 - 255	220 - 255	220 - 255	220 - 255	220 - 255
Fuse rating, A	10*1 20*2	100	20	100	100	100
Max. cable size, mm^2	4	35	4	35	35	35
RCD trip current, mA	300	300	300	300	300	300

*1. 50 Hz
*2. 60 Hz

Water

Sealing liquid for the vacuum pump

TEMPERATURE
The highest water temperature for maximum pump performance is 15 °C, although this can be exceeded by 5°C if a reduction in vacuum performance and pump capacity can be accepted. This applies primarily to sterilizers of the EN model, i.e. designed for the European market.

Models that are intended primarily for tropical climates can be simply modified to suit them for use with water temperatures up t o 35°C Details of how this is done are also given under “Connection and pressure” in this section, as well as in the “Customer-programmable functions” section in the SERVICE MANUAL.

HARDNESS
In order to minimise the sterilizer service and maintenance costs, the water hardness should not exceed 4dH (0.7mmol/l). A water softener is recommended if the water is harder than this.

Cooling water to the heat exchanger

The requirements in respect of temperature and hardness of the cooling water are the same as those for the water to the vacuum pump if the intended process performance is to be achieved. Again, on certain models, it is possible to modify the equipment to suit tropical conditions.

JAH010 . . . . . Water. Hospital Division, sideways-opening without tropical setting

Water

Pumping fluid for vacuum pump

TEMPERATURE

The highest permitted water temperature for maximum pump performance is 15°C. This temperature may be exceeded by 5°C if a concession on depth of evacuation and pump capacity can be accepted.

HARDNESS

The hardness of the water should not exceed 4 dH (0.7 mmol/l) in order to minimize the autoclave maintenance and service costs. A softening filter is recommended at higher hardness values.

Cooling water for heat exchanger

In order to achieve desirable process performance, the requirements regarding temperature and hardness of the cooling water are the same as for the pumping fluid for the vacuum pump.

JAA008 . . . . . Water. Hospital division, 2066E

Feed water for the steam generator

Requirements in respect of feed water for the steam generator are stricter, as the quality of the steam produced is directly dependent on the water quality and contents. Even modest quantities of salts, chlorides, phosphates or metals can cause a variety of problems.

Iron, manganese and silicon produce troublesome deposits on sterilised instruments, the sterilizer chamber and in the steam generator. Chlorides and salts cause corrosion and reduce the life of the equipment, while calcium and magnesium cause lime build-up and block-

ages. Other substances can produce non-condensable gases in the steam, putting sterilisation performance at risk.

If the steam contains unacceptably large quantities of non-condensable gases, we recommend that the feed water should be de-aerated. This should preferably be done by heating the water, rather than through the use of chemicals.
In such cases, a separate feed water supply must be arranged to the steam generator. See also 'Separate feed water to the steam generator'.

Only a part of these substances will pass over to the steam. As more water, containing further quantities, is constantly pumped into the steam generator, the concentration of such substances in the water will gradually increase. Practical experience shows that this concentration can increase by up to ten times after 1-2 weeks' operation. As a result, the steam generator needs to be maintained and emptied more frequently if the water quality is poorer.

The EN285 sterilizer standard gives guide values for evaporation residues in treated water. These values can serve as a guide when assessing the water quality, although it is not essential to comply with them in order to ensure reliable operation.

EN285 guide values:

Evaporation residues 10.0 mg/l, of which:

Silicon, as SiO2	1.0 mg/l
Iron	0.2 mg/l
Cadmium	0.005 mg/l
Lead	0.05 mg/l
Other heavy metals	0.1 mg/l
Chlorides	2.0 mg/l
Phosphates	0.5 mg/l

Recommended pH value = 5 - 7

Suitable conductivity £ 15 mS/cm

Suitable hardness £ 0.1 dH

In principle, there are three main types of feed water that are likely to be encountered.

Raw water
Untreated water taken directly from the mains should be used in the steam generator only if its quality is very high. The minimum requirements that should be accepted in this respect are as follows:

Iron and manganese	0.2 mg/l
Silicon	2 mg/l

Recommended pH value = 5 - 7

Suitable conductivity £ 400 mS/cm

Total hardness £ 4 dH

Softened water
If the quality of the raw water is good, apart from a hardness in excess of 4 °dH, softened water can be used. Softening replaces the calcium and magnesium ions with sodium. Sodium is not precipitated as a “lime” coating in the steam generator, which is the whole purpose of softening. However, softening does not sufficiently affect other substances that may be in the water, and so cannot be regarded as a suitable method of improving the quality in general.

A drawback of softening is that the concentration of alkaline carbonate in the water increases more than is desirable. This subsequently forms gases in the steam, degrading the quality of the sterilization steam. As a result, even when using softened water, a build-up of concentration in the water must be avoided through regular emptying.

De-ionised water
All salts are removed from de-ionised water, which is produced either in an ion exchange filter or by reverse osmosis. The resulting water is very suitable for steam generation, but must not be used as cooling water or in the vacuum pump as the materials in the two latter systems are not suited to its use.

Certain rules of thumb must be observed when using de-ionised feed water.

When using an ion exchange filter:

- The ion exchange filter should not be preceded by a softening stage, as the softened water reduces the efficiency of the ion exchange filter.
- Certain substances can destroy ion exchange filters, and so the input water should not contain higher concentrations than shown below:

Iron	05 mg/l
Manganese	0.02 mg/l
Free chlorine (after chlorination of the water)	0.05 mg/l

With reverse osmosis:

- The chlorine content should be lower still if reverse osmosis is used.
- Reverse osmosis should always be preceded by a water softener, which will increase the life of the osmosis equipment.

General

- The de-ionised water must have a low oxygen content, as oxygen-rich de-ionised water is aggressive and will attack the materials of the steam generator and feed water system. De-aeration is recommended.
- For the same reason, a stainless feed water system should be ordered for use with the steam generator.
- The lowest permissible conductivity of the de-ionised water is 0.1 mS/cm, as the conductivity is used for control of the water level in the steam generator.

Common water supply to the sterilizer and steam generator

In its standard version, the steam generator is supplied with water from the single common connection to the sterilizer, which means that values of temperature and hardness are the same for all the water-using equipment.

The water must always be colourless, with no solid contaminants such as sand, flakes of rust, graphite etc. The concentrations of other substances may vary, as previously described, while the temperature should be suited to the requirements of the vacuum pump sealing water.

Separate feed water supply to the steam generator

If a special water supply is provided for feed water to the steam generator, the water should be softened or de-ionised and then supplied to a separate tank on the sterilizer. In such cases, temperature values outside the limits shown above can be permitted.

Temperature
If a special supply and tank are provided for the steam generator feed water, the temperature of the water should not exceed 60°C.

Separate cooling water supply from a closed-circuit cooling system

If the sterilizer has been ordered with a separate cooling water circuit for connection to a closed-circuit cooling system, the cooling water circuit will have its own connection point.

Feed water for the steam generator

Requirements in respect of feed water for the steam generator are stricter, as the quality of the steam produced is directly dependent on the water quality and contents. Even modest quantities of salts, chlorides, phosphates or metals can cause a variety of problems.

Iron, manganese and silicon produce troublesome deposits on sterilised instruments, the sterilizer chamber and in the steam generator. Chlorides and salts cause corrosion and reduce the life of the equipment, while calcium and magnesium cause lime build-up and blockages. Other substances can produce non-condensable gases in th steam, putting sterilisation performance at risk.

If the steam contains unacceptably large quantities of non-condensable gases, we recommend that the feed water should be de-aerated. This should preferably be done by heating the water, rather than through the use of chemicals.
In such cases, a separate feed water supply must be arranged to the steam generator. See also 'Separate feed water to the steam generator'.

Only a part of these substances will pass over to the steam. As more water, containing further quantities, is constantly pumped into the steam generator, the concentration of such substances in the water will gradually increase. Practical experience shows that this concentration can increase by up to ten times after 1-2 weeks' operation. As a result, the steam generator needs to be maintained and emptied more frequently if the water quality is poorer.

The EN285 sterilizer standard gives guide values for evaporation residues in treated water. These values can serve as a guide when assessing

the water quality, although it is not essential to comply with them in order to ensure reliable operation.

EN285 guide values:

Evaporation residues 10.0 mg/l, of which:

Silicon, as SiO2	1.0 mg/l
Iron	0.2 mg/l
Cadmium	0.005 mg/l
Lead	0.05 mg/l
Other heavy metals	0.1 mg/l
Chlorides	2.0 mg/l
Phosphates	0.5 mg/l

Recommended pH value = 5 - 7

Suitable conductivity £ 15 mS/cm

Suitable hardness £ 0.1 dH

In principle, there are three main types of feed water that are likely to be encountered.

Raw water
Untreated water taken directly from the mains should be used in the steam generator only if its quality is very high. The minimum requirements that should be accepted in this respect are as follows:

Iron and manganese	0.2 mg/l
Silicon	2 mg/l

Recommended pH value = 5 - 7

Suitable conductivity £ 400 mS/cm

Total hardness £ 4 dH

Softened water
If the quality of the raw water is good, apart from a hardness in excess of 4 °dH, softened water can be used. Softening replaces the calcium and magnesium ions with sodium. Sodium is not precipitated as a “lime” coating in the steam generator, which is the whole purpose of softening. However, softening does not sufficiently affect other substances that may be in the water, and so cannot be regarded as a suitable method of improving the quality in general.

A drawback of softening is that the concentration of alkaline carbonate in the water increases more than is desirable. This subsequently

forms gases in the steam, degrading the quality of the sterilization steam. As a result, even when using softened water, a build-up of concentration in the water must be avoided through regular emptying.

De-ionised water
All salts are removed from de-ionised water, which is produced either in an ion exchange filter or by reverse osmosis. The resulting water is very suitable for steam generation, but must not be used as cooling water or in the vacuum pump as the materials in the two latter systems are not suited to its use.

Certain rules of thumb must be observed when using de-ionised feed water.

When using an ion exchange filter:

- The ion exchange filter should not be preceded by a softening stage, as the softened water reduces the efficiency of the ion exchange filter.
- Certain substances can destroy ion exchange filters, and so the input water should not contain higher concentrations than shown below:

Iron	05 mg/l
Manganese	0.02 mg/l
Free chlorine (after chlorination of the water)	0.05 mg/l

With reverse osmosis:

- The chlorine content should be lower still if reverse osmosis is used.
- Reverse osmosis should always be preceded by a water softener, which will increase the life of the osmosis equipment.

General

- The de-ionised water must have a low oxygen content, as oxygen-rich de-ionised water is aggressive and will attack the materials of the steam generator and feed water system. De-aeration is recommended.
- For the same reason, a stainless feed water system should be ordered for use with the steam generator.
- The lowest permitted conductivity in deionized water, in the standard construction, is 8 µS/cm, as the conductivity is utilized in regulating the water level in the steam generator. If water of lower conductivity is to be used, the steam generator must be equipped with float control.

Common water supply to the sterilizer and steam generator

In its standard version, the steam generator is supplied with water from the single common connection to the sterilizer, which means that values of temperature and hardness are the same for all the water-using equipment.

The water must always be colourless, with no solid contaminants such as sand, flakes of rust, graphite etc. The concentrations of other substances may vary, as previously described, while the temperature should be suited to the requirements of the vacuum pump sealing water.

Separate feed water supply to the steam generator

If a special water supply is provided for feed water to the steam generator, the water should be softened or de-ionised and then supplied to a separate tank on the sterilizer. In such cases, temperature values outside the limits shown above can be permitted.

Temperature
If a special supply and tank are provided for the steam generator feed water, the temperature of the water should not exceed 60°C.

Separate cooling water supply from a closed-circuit cooling system

If the sterilizer has been ordered with a separate cooling water circuit for connection to a closed-circuit cooling system, the cooling water circuit will have its own connection point.

JAH011 . . . . . Water. Hospital Division, sideways-opening with built-in steam generator

Water with built-in steam generator

Feed-water to steam generator

More stringent requirements apply to feed-water for steam generators. The quality of the steam produced is directly dependent on the quality and contents of the water. Small quantities of salts, chlorides, phosphates or metals may also cause problems of various kinds.

Iron, manganese and silicon produce awkward coatings both on sterilized instruments and in the autoclave chamber and steam generator. Chlorides and salts cause corrosion and reduce the life of equipment, and calcium and magnesium cause calcification and furring. Other sub-

stances may give rise to non-condensable gases in the steam, which adversely affects sterilizing capability.

If the steam contains unacceptably high quantities of non-condensable gases, we recommend that the feed-water should be degassed.
This degassing should primarily be done by heating and not with chemicals.

The steam boiler must be fed separately in such cases. Further information is given under the heading of "Separate feed-water to steam generator".

In steam generation only some of these substances are transported with the steam, at the same time as fresh water is gradually pumped into the steam generator. An undesirable build-up of the substances therefore takes place in the steam generator. Practical experience shows that the concentration increases up to 10 times after one to two weeks of operation. The worse the feed-water, the more often the steam generator has to be maintained and drained of water.

The autoclave standard EN285 contains guide values for evaporation residues in treated water. These values can serve as a guide when assessing water quality, but need not necessarily be respected with reliable operation in mind.

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Guide values according to EN285:

Evaporation residues	10.0 mg/l of which
Silicon in the form of SiO2	1.0 mg/l
Iron	0.2 mg/l
Cadmium	0.005 mg/l
Lead	0.05 mg/l
Other heavy metals	0.1 mg/l
Chlorides	2.0 mg/l
Phosphates	0.5 mg/l

Recommended pH-value = 5 - 7

Suitable conductivity ≤ 15 µS/cm

Suitable hardness ≤ 0.1 dH

There are in principle three main types of feed-water.

Råaw water
Untreated water direct from the mains to the steam generator should only be used if the water is of very high quality. The following minimum requirements apply to such untreated water:

Iron and Manganese	0.2 mg/l
Silicon	2 mg/l
Recommended pH-value = 5 - 7	
Suitable conductivity ≤ 400µS/cm	
Total hardness ≤ 4 dH	

Softened water
If the raw water is of high quality but its hardness is above 4°dH, softened water may be used. In water-softening Ca and Mg ions are exchanged for Na ions. Sodium is not deposited as limescale deposits in the steam generator, which is also the purpose of softening. On the other hand, the remaining contents are not significantly affected by softening, and softening therefore cannot be used as a general method for increasing quality.

A drawback in softening is that the concentration of alkaline bicarbonate in the water increases more than is desirable. The alkaline bicarbonate later forms gases in steam generation which adversely affect the sterilization steam. Build-ups must therefore also be avoided in the use of softened water through close draining intervals.

Deionized water
Deionized water is obtained by removing all salts with an ion-exchanger filter or reverse osmosis. Deionized water is a high-class type of water for steam generation but must not be used as cooling water or as a pumping fluid for the vacuum pump as the materials in these systems are not suitable for the purpose.

Certain rules of thumb must be adhered to in using deionized feed water.

With an ion-exchanger filter

- The ion-exchanger filter should not be preceded by a softening filter as the softened water adversely affects the efficiency of the ion-exchanger filter.
- Certain substances spoil ion-exchanger filters. The following values must therefore not be exceeded in the supply water.

Iron	0.05 mg/l
Manganese	0.02 mg/l
Free chlorine (after chlorination of water)	0.05 mg/l

With reverse osmosis

- In the case of reverse osmosis the chlorine content should be kept even lower.
- Reverse osmosis should always be preceded by a softening filter, which increases the lifetime of the osmosis unit.

General

- The deionized water should be low in oxygen as oxygen-rich deionized water is aggressive and corrodes the materials in the steam generator and feed-water system. Degassing is recommended.
- For the same reason, the steam generator should be ordered with a stainless-steel feed-water system.
- The lowest permitted conductivity of deionized water in the standard construction is 8 µS/cm, as the conductivity is utilized in regulating the water level in the steam generator. If water of lower conductivity is used, the steam generator must be equipped with float control.

Common water supply to autoclave and steam generator

In the standard construction with a built-in steam generator, the steam generator receives feed-water from the sole common water connection of the autoclave. Common temperature and hardness values therefore apply for all the consumption points of the autoclave.

The water must always be colourless and free of solid impurities such as sand, flakes of rust, graphite etc. The contents of other substances may vary, as described earlier, and the temperature must be adapted to the requirements for the vacuum-pump pumping fluid.

Separate feed-water to steam generator

The water must always be colourless and free of solid impurities such as sand, flakes of rust, graphite etc. The contents of other substances may vary, as described earlier, and the temperature should be adapted to the requirements for the vacuum-pump pumping fluid.

Temperature
If there is a separate water supply and tank for feed-water to the steam generator, the water temperature should not exceed 60 °C.

Separate supply of cooling water from closed cooling system

If the autoclave is ordered with a separate cooling-water circuit for connection to a closed recycling system, the cooling-water circuit has its own connection which is separated from the others.

Water

Pump service liquid

TEMPERATURE
Maximum permissible water temperature for maximum pump capacity and depth of vacuum is 15 °C. This temperature may be exceeded by 5 °C provided that depth of evacuation and pump capacity can be accepted.

Models intended mainly for tropical climates can easily be reconnected for water temperatures up to 35 °C. This topic is covered under “Connection and pressures” in this section and in the section headed “Customer-programmable functions” in the SERVICE MANUAL.

HARDNESS
In order to minimize the sterilizer maintenance- and service expenses the water hardness should not exceed 4 dH (0,7 mmol/l). A water softener is recommended where the water is harder than this.

Common water supply to sterilizer and steam generator

Usually the steam generator is supplied with water from one common water source (intake) on the sterilizer, why the values of temperature and hardness will be common for all consuming units of the sterilizer.

The feed water should be colourless and free from solid particles such as rust flakes, graphite etc. The content of other matters may vary but the iron content should not exceed 0.2 mg/l, to avoid stains on sterilized goods.

Separate feed water to steam generator

If there is a separate water system supplying the steam generator, this water is usually treated through a filter or some other kind of water treatment device and then connected to a separate tank on the sterilizer. In such cases values deviating from the given ones may be accepted.

TEMPERATURE
If there is a separate supply and tank for the steam generator feed water, the water temperature should not exceed 60 °C.

DEIONIZED WATER
De-ionized water may only be connected if the steam generator is designed for this.

If the steam generator is intended for de-ionized water, the conductivity should not be less than 0,5 µS/cm.

The chemical composition of de-ionized water may vary depending on the water treatment method used. Sterilizer standard EN285 states guideline values for evaporation deposits in de-ionized water. These values may serve as a guide when assessing water quality, but need not necessarily be complied with for reliable operation.

Guideline values to EN285:

Evaporation deposits 10,0 mg/l, of which:

Silicon in the form of SiO_2	1,0 mg/l
Iron	0,2 mg/l
Cadmium	0,005 mg/l
Lead	0,05 mg/l
Other heavy metals	0,1 mg/l
Chlorides	2,0 mg/l
Phosphates	0,5 mg/l

Recommended pH: 5 to 7

Suitable conductivity ≤ 15 µS/cm

Suitable hardness ≤ 0,1 dH

JAX079 . . . . . Water connection and pressure. Hospital division, GE2066.

Connection

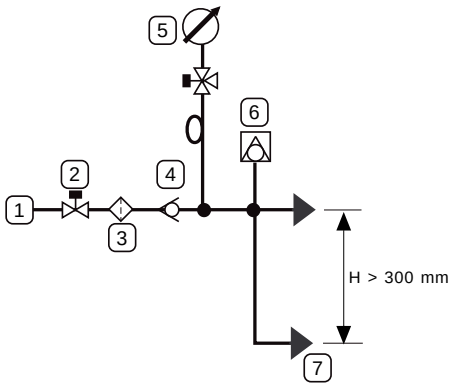
Any connections made to a drinking water supply must comply with national and local regulations. In countries where EU regulations apply, the national requirements will gradually be complemented by harmonised EN standards, regulating the connection and prescribing equipment for such purposes as reverse siphon protection.

If softened or de-ionised water is supplied to a separate tank for the steam generator, an air break is provided in the tank, preventing reverse siphonage to the water treatment equipment.

If a closed-circuit system for separate cooling water supply, not connected to the potable water supply system, is connected to the sterilizer, any reverse siphon protection needed can be arranged in the closed circuit.

Reverse siphon protection
When the equipment is installed, an approved (and, in certain case type-tested) reverse-siphon protection device must be fitted in the supply line to the sterilizer. Details of the particular types of reverse siphon protection devices that must be used, and how they must be installed, are regulated by the responsible authorities in each country.

- In the absence of specific rules for connection, we recommend that a connection to a potable water supply should be arranged as follows:



1	Main supply line	2	Shut-off valve
3	Filter	4	Check valve
5	Pressure gauge, including water pockets and isolating valve	6	Reverse siphon protection
		7	Connection to sterilizer

Pressure

- Connect the sterilizer through a shut-off valve to a supply system capable of providing a pressure of 3.5 - 6 bar(e). Models capable of being modified for use in tropical conditions can be connected to supply systems capable only of providing pressures of 1.0 bar(e).

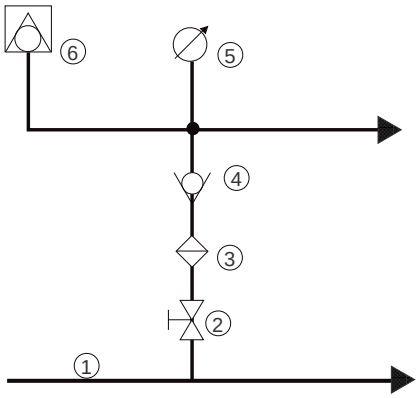
JAX027 . . . . . Water. Connection and pressure. Hospital division

Connection and pressure

A gauge is not compulsory but contributes to easier supervision of the installation.

- Connect the sterilizer to a supply line where the pressure should be a minimum of 250 kPa (36 psig) and maximum 600 kPa (87 psig).

Models capable of being confederated for tropical conditions can be connected to pipework systems with pressure as low as 1.0 bar(g).



1	Main line	2	Shut-off valve
3	Filter	4	Non-return valve
5	Pressure gauge	6	Anti-siphon device

JAX036 . . . . . Water. Ph division.

Water

JAX113 . . . . . Water, for Heat-exchanger, Ph-division

Cooling water for heat exchanger

The sterilizer has a pressure gauge connected to the cooling water supply pipe. It is normally situated in the service area. The cooling water must not be corrosive, nor must it contain abrasives or scaling particles. The water salt content should not cause scaling as a result of the temperature. If the cooling water is to be recirculated, the pressure in the return pipe should be at least 250 kPa (36 psig) lower than in the supply pipe.

- Connect the sterilizer via a shut off valve to a cooling water supply line where the pressure should be a minimum of 350 kPa (50 psig) and a maximum of 600 kPa (87 psig). A non return valve if necessary should be supplied by the customer if not otherwise stated in the contract.

JAX038 . . . . . Water, process/GEC, Ph-division

Water for the chamber

The water can be either softened, deionized or distilled. The water quality is dependent on the requirement of the loads being processed.

- Connect the sterilizer via a shut off valve to a supply line where the pressure should be a minimum of 350 kPa (50 psig) and a maximum of 600 kPa (87 psig). The lower the pressure, the longer the filling time. A non return valve if necessary should be supplied by the customer if not otherwise stated in the contract.

JAX039 . . . . . Water, process/ampoule-cleaning, Ph-division

Water for chamber (testing and rinsing ampoules)

These connections will differ from one sterilizer to another. See installation drawing.

The water should be softened, if not otherwise prescribed in the contract or on the installation drawings.

A non return valve and pressure gauge, if required, should be supplied by the customer if not otherwise stated in the contract.

- Connect the sterilizer via shut off valve (s) to a water distribution pipe system.

JAX054 . . . . . Water GEE

TEMPERATURE
Maximum permissible water temperature for maximum pump capacity and depth of vacuum is 15 ^{o}C. This temperature may be exceeded by 15 ^{o}C provided that the loss of depth of evacuation and pump capacity can be accepted.

PRESSURE
Connect the sterilizer to a supply line where the pressure should be a minimum of 250 kPa (36 psig) and maximum 600 kPa (87 psig).

HARDNESS
In order to minimize the sterilizer maintenance- and service expenses the water hardness should not exceed 4 dH (0,7 mmol/l). A water softener is recommended where the water is harder than this.

JAX040 . . . . . Water, for V-pump, Ph division

Pump service liquid

TEMPERATURE
Maximum permissible water temperature for maximum pump capacity and depth of vacuum is 15 °C. This temperature may be exceeded by 15 °C provided that the loss of depth of evacuation and pump capacity can be accepted.

PRESSURE
Connect the sterilizer to a supply line where the pressure should be a minimum of 250 kPa (36 psig) and maximum 600 kPa (87 psig).

HARDNESS
In order to minimize the sterilizer maintenance- and service expenses the water hardness should not exceed 4 dH (0,7 mmol/l). A water softener is recommended where the water is harder than this.

JAX041 . . . . . Water to steam-generator Ph-division

Common water supply to sterilizer and steam generator

Usually the steam generator is supplied with water from one common water source (intake) on the sterilizer, why the values of temperature and hardness will be common for all consuming units of the sterilizer.

The feed water should be colourless and free from solid particles such as rust flakes, graphite etc. The content of other matters may vary but the iron content should not exceed 0.2 mg/l, to avoid stains on sterilized goods.

Separate feed water to steam generator

If there is a separate water system supplying the steam generator, this water is usually treated through a filter or some other kind of water treatment device and then connected to a separate tank on the sterilizer. In such cases values deviating from the given ones may be accepted.

TEMPERATURE
If there is a separate supply and tank for the steam generator feed water, the water temperature should not exceed 60 °C.

DEIONIZED WATER
De-ionized water may only be connected if the steam generator is designed for this.

If the steam generator is intended for de-ionized water, the conductivity should not be less than 0,5 µS/cm.

The chemical composition of de-ionized water may vary depending on the water treatment method used. Sterilizer standard EN285 states guideline values for evaporation deposits in de-ionized water. These values may serve as a guide when assessing water quality, but need not necessarily be complied with for reliable operation.

Guideline values to EN285:

Evaporation deposits 10,0 mg/l, of which:	
Silicon in the form of SiO_2	1,0 mg/l
Iron	0,2 mg/l
Cadmium	0,005 mg/l
Lead	0,05 mg/l
Other heavy metals	0,1 mg/l
Chlorides	2,0 mg/l
Phosphates	0,5 mg/l

Recommended pH: 5 to 7

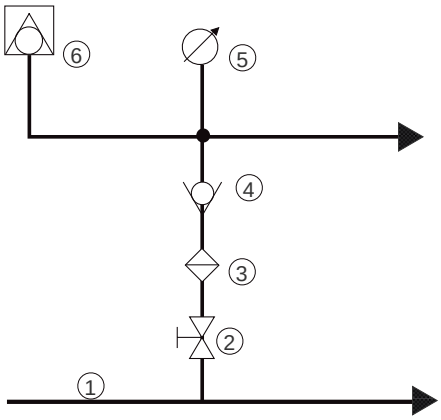
Suitable conductivity ≤ 15 µS/cm

Suitable hardness ≤ 0,1 dH

JAX042 . . . . . Water. Connection. Ph division

Connection

A gauge is not compulsory but contributes to easier supervision of the installation.



1	Main line	2	Shut-off valve
3	Filter	4	Non-return valve
5	Pressure gauge	6	Anti-siphon device

JAX088 . . . . . Steam qualities Ph div Pre installation instruction

Steam can either be “plant steam”, “coarse filtered steam” (1 0 –20 µm) , “fine filtered steam” (3 – 15 µm) or “pure steam”.
The type of steam to be used is depending on the required quality of processed load.

The chapter “steam” below covers the basic requirements from Getinge AB.

JAX028 . . . . . Steam. GE-units

Steam

Sterilizers not equipped with built in steam generator should be connected to a central steam production plant. The chambers of these ster-

ilizers are not equipped with safety valve, provided they are not furnished with compressed air or any other pressure causing medium.

The user therefore is obliged to arrange with safety valves in the steam supply pipe as directed.
No matter if the sterilizer is equipped with safety valve or not, the user has to install a safety valve with adequate size in the steam supply line.

The result of a steam sterilization is very much dependent on the character of the steam used. Therefore some basic demands should be raised on the quality of steam, supplying sterilizers.

Steam generators based upon evaporation from high pressure ho water should not be used since the steam produced is of inferior quality for sterilization purposes.

Cleanness

1. Solid particles such as welding pellets, graphite, rust flakes, sand etc. must not be found since the steam comes in physical contact with the goods to be sterilized.
2. Liquids, except very small amounts of water, must not occur for the same reason.
3. Gases will prevent a close contact between the steam and the micro-organisms and should be minimized as below.
   - Hydrazine (N_2H_4) max. 0,11 mg/kg steam.
   - Ammonia (NH_3) max 5 mg/kg steam.
   - Air and/or non-condensable gases max 7 ml per 200 ml condensate, formed by the steam-air/gas mixture.
4. Other chemicals such as softening residuals and similar things must not occur in sterilizing steam.
   - Salt content max 1 mg/kg steam.

Analysis of condensate

An analysis of the condensate from the steam gives an idea about its cleanness regarding additional agents. These should not occur in con-

centrations exceeding the values given in mg/kg condensate in the table below.

Evaporation residuals 1,0 of which:	
Silica SiO2	0,1 mg/kg
Iron	0,1 mg/kg
Cadmium	0,005 mg/kg
Lead	0,05 mg/kg
Other heavy metals	0,1 mg/kg
Chloride	0,1 mg/kg
Phosphate	0,1 mg/kg
Recommended pH-value = 5 - 7	
Suitable conductivity < 3 µS/cm (at 20 °C)	
Suitable hardness ≤ 0,1 dH	

JAX110 . . . . . Steam converters. Safety valve

Steam

The owner of the steriliser is responsible for ensuring that the steam feed line to the steam converter is fitted with a correctly-dimensioned safety valve.

JAX029 . . . . . Steam. Pressure and dryness. GE-units

Pressure

A Getinge high pressure steam sterilizers should be supplied with steam, the pressure of which should be 2.5 to 2.7 bar when indicated by the sterilizer pressure gauge marked Steam supply.

If the steam supply line pressure exceeds the sterilizer working pressure, the user has to install a pressure reduction unit and safety valve with adapted opening pressure and sufficient blow off capacity.

There are other pressure requirements for gas-formaldehyde- and disinfection sterilizers. Consult the installation drawing for appropriate information.

B Permissible pressure fluctuations max ±10.0 kPa.

Moisture content

Sterilizers should be supplied with dry saturated steam. The physical state “dry saturated” is difficult to maintain in a practical application, and measurement followed by control of the moisture content is an awkward procedure.

Practising the advice later given which are based upon practical experience, will generally result in a steam with satisfactory moisture content. This means that nor will it be superheated, a state of the steam which is hazardous in connection with sterilization because it does not contribute with the humidification necessary for destructing microorganisms.

Methods and values for determining the quality of the steam and the degree of superheating are described in standard EN285.

JAX043 . . . . . Steam. Pressure and dryness. Ph division Other than GE-sterilizers.

Pressure

A Getinge sterilizers should be supplied with steam, the pressure of which should be 2.5 to 3.0 bar when indicated by the sterilizer pressure gauge marked “Steam supply”.
Consult the installation drawing for appropriate information.

If the steam supply line pressure exceeds the sterilizer working pressure, the user has to install a pressure reduction unit and safety valve with adapted opening pressure and sufficient blow off capacity.

B Permissible pressure fluctuations max ±10.0 kPa.

Moisture content

Sterilizers should be supplied with dry saturated steam. The physical state dry saturated is difficult to maintain in a practical application, and measurement followed by control of the moisture content is an awkward procedure.

Practising the advice later given which are based upon practical experience, will generally result in a steam with satisfactory moisture content. This means that nor will it be superheated, a state of the steam which is

hazardous in connection with sterilization because it does not contribute with the humidification necessary for destructing microorganisms.

JAX089 . . . . . . Steam. Pressure and dryness. Ph division Other than GE-sterilizer . . . . Pre installation instruction

Pressure

A Consult the installation drawing for appropriate information, concerning steam pressure.

If the steam supply line pressure exceeds the sterilizer working pressure, the user has to install a pressure reduction unit and safety valve with adapted opening pressure and sufficient blow off capacity.

B Permissible pressure fluctuations max ±10.0 kPa.

Moisture content

Sterilizers should be supplied with dry saturated steam. The physical state dry saturated is difficult to maintain in a practical application, and measurement followed by control of the moisture content is an awkward procedure.

Practising the advice later given which are based upon practical experience, will generally result in a steam with satisfactory moisture content. This means that nor will it be superheated, a state of the steam which is hazardous in connection with sterilization because it does not contribute with the humidification necessary for destructing microorganisms.

JAX030 . . . . . Practical arrangements. Central steam

Practical arrangements

1. Connect the sterilizer to a live steam line, not to an inadequately drained or inadequately vented “dead leg”. Long branch connections to sterilizers should be avoided.
2. Dimension the piping for a steam velocity of 38 m/s at the pressure 250 kPa. If several sterilizers are connected to the same pipe, calculate with a simultaneity factor 0.8.
3. The steam supply pipes should fall minimum 1:50 in the flow direction.
4. Introduce reducing valve(s) in the supply line if the pressure is higher than specified in the installation drawing. The steam pres-

sure upstream the reducing valve should not fluctuate more than 10%. Do not reduce the pressure with a factor smaller than 0,5 in each stage. Use a second reducing valve for greater reduction ratio. Each reducing valve must be followed by a safety valve.

If the steam in the supply pipe is wet, include dewatering as shown in Figure "A" just before the reducing valve, as shown in the sketches below.

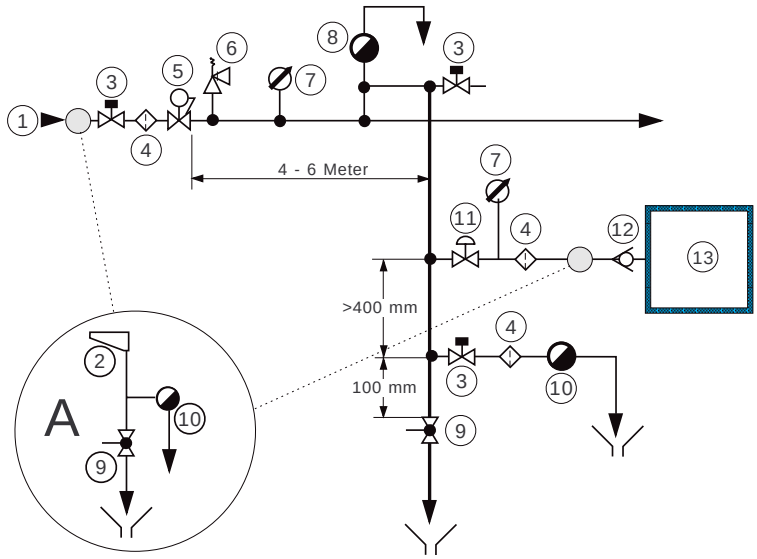
The safety valve exhaust pipe should have at least the same dimension as the valve exhaust connection and must not contain chokes or shut off devices. Water pockets formed in the piping, must be drained.

5. There must be no chokes or restrictions placed in horizontal pipes.
6. Fit the last reducing valve not more than 6 m pipe length away from the sterilizer, but not closer than 4 m if maximum reducing ratio (2:1) is utilized.

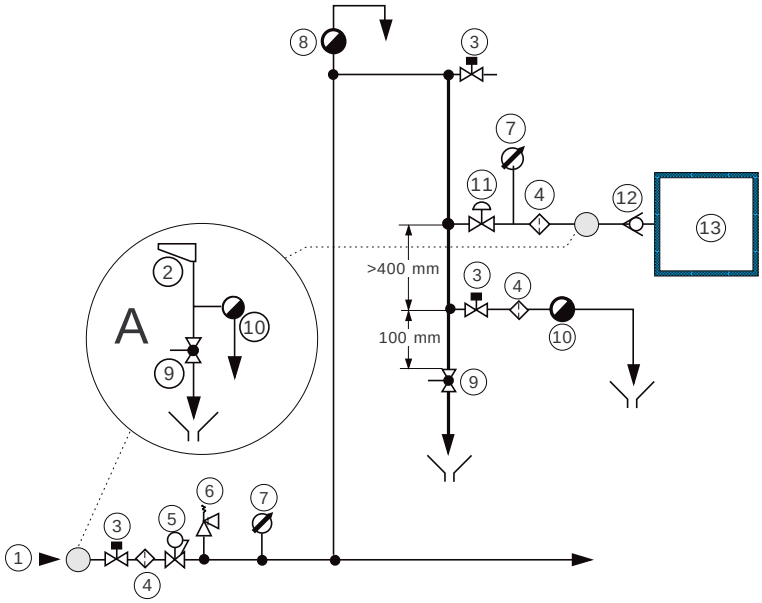
If the reducing valve is positioned much more than six metres from the sterilizer, include dewatering as shown in Figure "A" just before the sterilizer.

7. The last dewatering device (see figure below) should not be placed further than 1 meter away from the sterilizer steam intake.
8. No steam consumers other than sterilizers should be connected down-streams the last reducing valve.
9. Branch pipes should be connected on top of horizontal main pipe.
10. A connection should be provided between reducing valve and sterilizer on the steam supply line to enable sampling steam for quality check up.
11. Because of its daily use, the shut off valve should be of the easy-to-handle type for instance a remote controlled ball valve.
12. Insulate steam pipes up to the sterilizer steam intake

An arrangement according to the following figure normally satisfies the demand for dewatering, filtration and supervision facilities when supplying a sterilizer with steam from a main steam supply line.



Supply line in ceiling



Supply line in floor or in the storey below

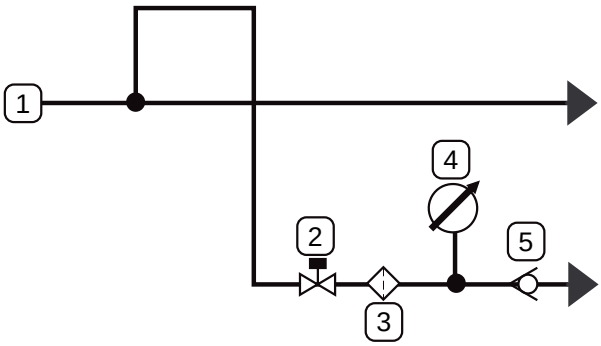
1	High-pressure line	8	Vent
2	Labyrinth diverter / separator	9	Ball valve
3	Shut-off valve	10	Steam trap
4	Filter	11	Remote-controlled valve
5	Reducing valve	12	Non-return valve
6	Safety valve	13	Sterilizer
7	Pressure gauge		

JAX080 . . . . . Compressed air. Sterilizer with manual door

Compressed air

Branch pipe from over head line should go out from the top of the main pipe as shown by the illustration. A shut-off valve, a strainer and a check valve should be installed in the pressurized air supply line close to the sterilizer, while a pressure gauge is recommended for easy supervision of the supply system.

- Connect the sterilizer air supply input to the building compressed air supply line which should be capable of delivering clean air free from oil water and particles of minimum 6, maximum 8 bar.



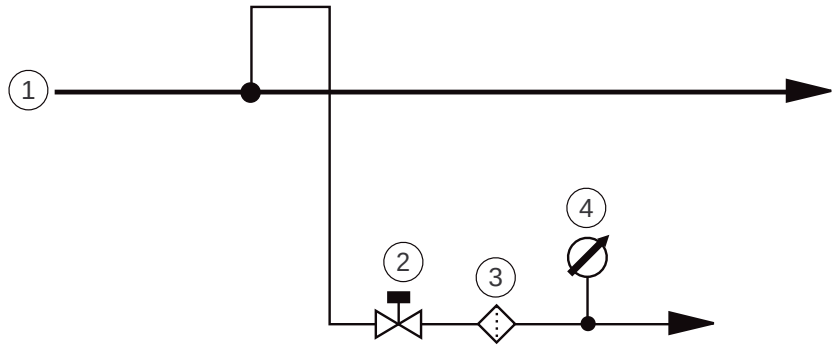
1	Main line	2	Shut-off valve
3	Filter	4	Pressure gauge
5	Check valve		

JAM006 . . . . . Compressed air. Sterilizer with manually operated door.

Compressed air

Branch pipe from over head line should go out from the top of the main pipe as shown by the illustration. A shut-off valve and strainer should be installed in the pressurized air supply line close to the sterilizer while a pressure gauge is recommended for easy supervision of the supply system.

- Connect the sterilizer air supply input to the building compressed air supply line which should be capable of delivering clean air free from oil water and particles of minimum 600 kPa maximum 800 kPa.



1	Main line	2	Shut-off valve
3	Filter	4	Pressure gauge

JAX049 . . . . . Compressed air. Ph. div.

Compressed air

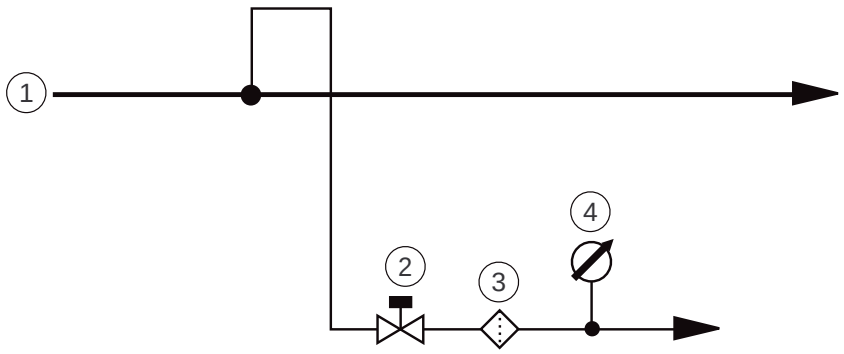
The air oil content should be less than 0,02 ppm and maximum permissible water content correspond to the dew point at 10°C.

Less oil content may be required to fulfil quality demands on the final product.

Less water content may be required if compressed air pipes or ai equipment is located in non-heated rooms.

JAX055 . . . . . Compr Air, GEE

Required air pressure is 600 kPa (87.0 psig) - 800 kPa (116.0 psig)
Branch pipe from over head line should be connected as shown below.



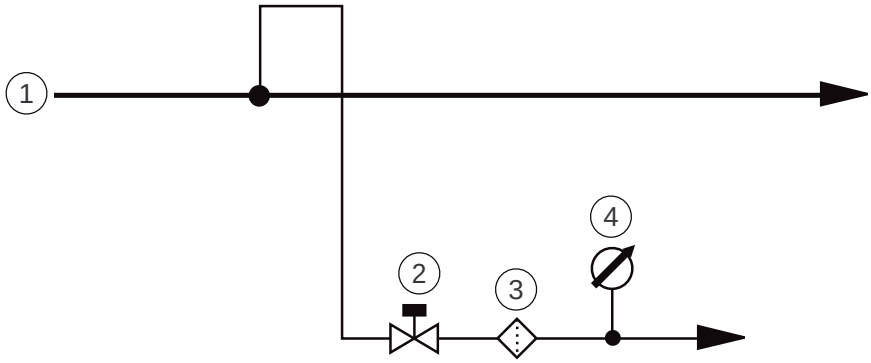
1	Main supply	2	Shut off valve
3	Strainer	4	Pressure gauge

JAX069 . . . . . Instrument air, Ph-division

Instrument air

The sterilizer is equipped with pressure gauge for instrument air placed in the service.

- Connect the sterilizer instrument air supply fitting with a compressed air source capable of supplying air with a minimum pressure of 600 kPa (87,0 psig) and a maximum of 800 kPa (116,0 psig) free of oil, water and solid particles as stipulated above.



1	Main supply	2	Shut off valve
3	Strainer	4	Pressure gauge

JAX045 . . . . . Chamber & door seal air, Ph-division

Chamber and door seal air

If the instrument air line is sufficient for the peak air consumption without causing a pressure drop below 600 kPa (87,0 psig) the chamber air may be connected to the same air supply. A non return valve and sterile air filter, if required, should be supplied by the customer if not otherwise stated in the contract.

- Connect the sterilizer chamber air supply fitting via a shut off valve with a compressed air source capable of supplying air with a minimum pressure of 300 kPa (43,5 psig) and a maximum of 800 kPa (116,0 psig), sterile, filtered and free from oil and water as stipulated above.

JAX056 . . . . . Nitrogen GEE-Ex

Nitrogen

A shut off valve and a strainer should be installed, near the sterilizer, in the nitrogen supply piping. A pressure gauge is recommended for easier supervision of the system.

Connect the sterilizer to a nitrogen source with a pressure of 6 bar.

JAX081 . . . . . Discharge from safety valve, 2066

Discharge from safety valve

Some sterilizers are provided with safety valves.
Safety valves with a small orifice are provided with exhaust pipes leading the blown off steam or air to a safe position under the sterilizer

Safety valves with larger orifice are not provided with exhaust pipes at delivery.

The reason for this is that, in most cases, it is safer to discharge the large volumes of steam/air outdoors. If this cannot be arranged, the safety valve must be fitted with a pipe that conducts the steam/air to a safe position. The choice of discharge point must be approved by the responsible authority.

In both cases it is recommended that, where circumstances permit, the discharge pipes should be modified/run so that they discharge in a safe position outside the building. In some countries, the pressure vessel regulations require this to be done.

WARNING: The safety valve from formalin sterilizers must always discharge to a safe position in the open air, as formalin in poisonous.

A tubing system connected to the safety valve:

- **must have at least the same orifice as the safety valve**
- **must, in the case of longer runs, be designed and sized as needed to prevent unnecessary pressure drop.**
- **must NOT contain shut-off valves or other throttling devices**

- **must be drained so that water pockets are avoided..**

WARNING! The outlet from the safety valve always has to be connected to a tube leading the exhaust to a safe position.

JAM007 . . . . . Blow-out from safety valve GEF-449E

Discharge from safety valve

Sterilizers with steam generators are provided with a safety valve. This is provided on delivery with a discharge pipe which directs blown-out steam to a safe area beneath the unit.

Where circumstances permit, it is recommended that the discharge pipe should be altered or moved so that it discharges at a safe place outside the building. In some countries the pressure-vessels authority requires this to be done.

The reason for this is that in most cases it is safer to direct the steam outdoors in view of the large volume discharged. If this cannot be done, the safety valve must be provided with a pipe which directs the steam to a safe point. The responsible authority has to approve the choice of discharge.

A pipe connected to the safety valve,

- **must** have at least the same opening as the safety valve
- **must**, in the case of longer lines, be calculated and dimensioned to counteract drop in pressure
- **must NOT** contain shut-off valves or other constrictions
- **must** be drained so that water pockets are avoided.

WARNING: The discharge from the safety valve must always be connected to a pipe which leads to a safe place.

Exhaust from safety valve

Some sterilizers are provided with safety valves.
Safety valves with a small orifice t are provided with exhaust pipes leading the blown off steam or air to a safe position in the service area.

Safety valves with larger orifice are not provided with exhaust pipes at delivery.
The reason for this is that it, in most cases, is wise to lead the steam / air out from the service area because of the great volume ejected. The safety valve has to be provided with a tube leading the ejected steam / air to a safe position in cases where it is not considered necessary to lead the exhaust tube out of the service area

A tubing system connected to the safety valve:

- **must** have at least the same orifice as the safety valve
- **must NOT** contain shut-off valves or other throttling devices
- **must** be designed to avoid the forming of water pockets or if this is not possible provided with drain tubes leading off the trapped water

WARNING! The outlet from the safety valve always has to be connected to a tube leading the exhaust to a safe position.

JAX075 . . . . . Drains and ventilation. GE sterilizers, 2066

Drain

Sterilizers equipped with more than one waste water connection should have all these piped separately to the floor gutter.

Check if there are any local regulations regarding the drain arrangements, (formaldehyde or gas residuals in the water, temperature limits, etc.).

Drains from the sterilizer are run through separate pipes, for contaminated and non-contaminated water respectively. The contaminated water must always be discharged directly to drain.

The non-contaminated wat e r-mainly cooling wa t er-can be recycled or recovered if required and, after cooling if necessary, again used as process water. See also under Cooling Water.

- Run the drain pipe(s) with a slope towards the floor drain, where it/ they must terminate at a distance of at least two pipe diameters above the highest water level of the water trap, but at least 20mm above the water level. Pipes shorter than 1 .5m require only very slight slope.
- The capacity of the waste water system must comply with current regulations. The technical data for the sterilizer gives values of the design parameters to be used when calculating design flows for hospital environments. These calculations must be made in accordance with national regulations. Normally, after calculation of the design flow rate, the system capacity shall be increased by a furth er 50%.
- Floor drains must have an opening of not less than 2 0 0 m m diameter, as the number of drain pipes can be as high as seven from certain models.
- Dimension the sewerage for short duration temperatures about 100 °C..

Plastic drain pipes should be avoided, as a loss of cooling media could result in the drainage system being exposed to water at 100 °C for a longer period of time.

- The discharge pipe from a steam generator should be fixed at its open end which should be at least 0,5 m pipe length away from the discharge valve.
- Arrange if possible for cooling the discharge pipe when emptying the steam generator in order to avoid steaming and noise in the room. However, this is not essential if the steam generator is fitted with a device for automatic venting.

Ventilation

Using the values for heat release given in the technical specification, the ambient temperature around the sterilizer must be regulated to 15-35°C by means of a suitable ventilation system. If possible, relative humidity should not exce ed 85%.

These requirements apply not only to the service area of the apparatus but also to the operator zones.

Note that a recently sterilized load provides a substantial thermal input to the operator's zone when removed from the sterilizer. This heat contribution is not quantified in the technical specification.

Each sterilizer door is fitted with a ventilation stub, which must be connected to the ventilation system. This provides an efficient barrier to prevent excessive surplus moisture and heat finding their way into the operator's zone.

JAH012 . . . . . Outlets. Separated outlets.

Outlets

Discharge pipes coming from different parts of the autoclave must not be joined together on the autoclave and must instead be routed separately with unreduced dimensions to the floor drain.

Comply with local regulations relating to wastewater (admixture of formalin, temperature restrictions etc.).

The outlets from the autoclave are divided with different pipes fo contaminated and non-contaminated water. The contaminated wate must always be routed directly to the outlet.

The non-contaminated water, which is chiefly used for cooling water, may if wished be recycled and after cooling, where required, be used again as process water. See under Cooling water.

- Route discharge pipe(s) with a drop towards the floor drain where it or they is or are to end at a distance of at least two pipe diameters above the highest water level of the trap, but never at a distance of less than 20 mm. Pipes less than 1.5 m in length require only a minor drop.
- The wastewater installation must be sized in accordance with applicable regulations. The starting value for calculating normal flow in hospital settings is stated in the technical data of the autoclave. The calculation must be carried out in accordance with national rules. An increase in dimensions of a further 50% generally has to be made on the basis of the calculated normal flow.

JAH013 . . . . . Outlets Non-separated outlets???

Outlets

Discharge pipes coming from different parts of the autoclave must not be joined together on the autoclave and must instead be routed separately with unreduced dimensions to the floor drain.

Comply with local regulations relating to wastewater (admixture of formalin, temperature restrictions etc.).

- Route discharge pipe(s) with a drop towards the floor drain where it or they is or are to end at a distance of at least two pipe diameters above the highest water level of the trap, but never at a distance of less than 20 mm. Pipes less than 1.5 m in length require only a minor drop.
- The wastewater installation must be sized in accordance with applicable regulations. The starting value for calculating normal flow in hospital settings is stated in the technical data of the autoclave. The calculation must be carried out in accordance with national rules. An increase in dimensions of a further 50% generally has to be made on the basis of the calculated normal flow.

JAH014 . . . . . Outlets, addition Autoclaves <=6912???

- The floor drain should not have an opening smaller than 200 mm.
- Size the wastewater installation for short-term temperatures around 100 °C..

Plastic outlets should be avoided as a loss of cooling medium may result in the outlet being exposed to discharge water at 100 °C over a prolonged period.

JAH015 . . . . . Outlets, addition Autoclaves >6912

- The floor drain must be sized for the minimum peak flow stated in the technical data under connections, used cooling water.
- Size the wastewater installation for short-term temperatures around 100 °C.

Plastic outlets should be avoided as a loss of cooling medium may result in the outlet being exposed to discharge water at 100 °C over a prolonged period.

JAH016 . . . . . Outlets, addition with built-in steam generator.

- The free end of the drain pipe of the steam generator must be at least 0.5 m in length counting from the tapping valve and must be fixed.
- Arrange cooling of the drain pipe if possible so that steam formation and noise when emptying the steam generator are reduced. However, this is not necessary if the steam generator is fitted with an extra for automatic blow-off.
- The free end of the drain pipe of the water-level stand must be at least 0.5 m in length counting from the drain valve and must be secured.

JAH017 . . . . . Ventilation, sideways-opening.

Ventilation

The ambient temperature of the autoclave must be regulated to 15-35 °C by adjusting the ventilation and in compliance with the heat emission values stated in the technical specification. The relative humidity should preferably not exceed 85 %.
The requirements apply to the service space of the apparatus as well as the operator spaces.

Note that a recently sterilized load makes a significant addition of heat to the operator space when it has been removed from the autoclave. This heat emission is not indicated in the technical specification.

JAX117 . . . . . Drains and ventilation. GE sterilizers, 2044

Drain

Sterilizers equipped with more than one waste water connection should have all these piped separately to the floor gutter.

Check if there are any local regulations regarding the drain arrangements, (formaldehyde or gas residuals in the water, temperature limits, etc.).

Drains from the sterilizer are run through separate pipes, for contaminated and non-contaminated water respectively. The contaminated water must always be discharged directly to drain.

The non-contaminated wat e r-mainly cooling wa t er-can be recycled or recovered if required and, after cooling if necessary, again used as process water. See also under Cooling Water.

- Run the drain pipe(s) with a slope towards the floor drain, where it/ they must terminate at a distance of at least two pipe diameters above the highest water level of the water trap, but at least 20mm above the water level. Pipes shorter than 1 .5m require only very slight slope.
- The capacity of the waste water system must comply with current regulations. The technical data for the sterilizer gives values of the design parameters to be used when calculating design flows for hospital environments. These calculations must be made in accordance with national regulations. Normally, after calculation of the design flow rate, the system capacity shall be increased by a furth er 50%.
- Floor drains must have an opening of not less than 2 0 0 m m diameter, as the number of drain pipes can be as high as seven from certain models.
- Dimension the sewerage for short duration temperatures about 100 °C..

Plastic drain pipes should be avoided, as a loss of cooling media could result in the drainage system being exposed to water at 100 °C for a longer period of time.

- The discharge pipe from a steam generator should be fixed at its open end which should be at least 0,5 m pipe length away from the discharge valve.
- Arrange if possible for cooling the discharge pipe when emptying the steam generator in order to avoid steaming and noise in the room. However, this is not essential if the steam generator is fitted with a device for automatic venting.

Ventilation

Using the values for heat release given in the technical specification, the ambient temperature around the sterilizer must be regulated to 15-35°C by means of a suitable ventilation system. If possible, relative humidity should not exce ed 85%.

These requirements apply not only to the service area of the apparatus but also to the operator zones.

Note that a recently sterilized load provides a substantial thermal input to the operator's zone when removed from the sterilizer. This heat contribution is not quantified in the technical specification.

Drain

Sterilizers equipped with more than one waste water connection should have all these piped separately to the floor gutter.

Check if there are any local regulations regarding the drain arrangements, (formaldehyde or gas residuals in the water, temperature limits, etc.).

The drain from the sterilizer is divided with separate pipes for contaminated and non-contaminated water. Then on contaminated water can, if required, be recovered and, after cooling, be reused as process water. The contaminated water must always run directly to waste.

- Run a sloping pipe from the outlet with unreduced bore to the drain where it should terminate not closer than two pipe diameters above the highest liquid level of the water trap.
- Dimension the sewerage for short duration temperatures about 100 °C.
- The discharge pipe from a steam generator should be fixed at its open end which should be at least 0,5 m pipe length away from the discharge valve.
- Arrange if possible for cooling the discharge pipe when emptying the steam generator in order to avoid steaming and noise in the room.
- The discharge pipe from a steam generator sight glass should be fixed at its open end which should be at least 0,5 m pipe length away from the discharge valve.

Ventilation

By means of adequate ventilation the sterilizer ambient temperature should be kept at 15 - 35 °C.

JAX046 . . . . . Drain and ventilation. Ph division. Other than GE-sterilizers

Drain

Sterilizers equipped with more than one waste water connection should have all these piped separately to the floor gutter.

Check if there are any local regulations regarding the drain arrangements, (formaldehyde or gas residuals in the water, temperature limits, etc.).

Because most industrial sterilizers release their pressure through the autoclave drain, an air/water separator should be installed to prevent water splashing in the service area.

- Run a sloping pipe from the outlet with unreduced bore to the drain where it should terminate not closer than two pipe diameters above the highest liquid level of the water trap.
- Dimension the sewerage for short duration temperatures about 100°C.
- The discharge pipe from a steam generator should be fixed at its open end which should be at least 0,5 m pipe length away from the discharge valve.
- Arrange if possible for cooling the discharge pipe when emptying the steam generator in order to avoid steaming and noise in the room.
- The discharge pipe from a steam generator sight glass should be fixed at its open end which should be at least 0,5 m pipe length away from the discharge valve.

Ventilation

By means of adequate ventilation the sterilizer ambient temperature should be kept at 15 - 35 °C.

JAX076 . . . . . Formalin sterilizer. Hospital division, GE2066

Special requirements for formalin sterilizers

Formalin sterilizers have special requirements in respect of ventilation. The ventilation system must ensure that the smell of formalin cannot spread to the surroundings, whether within the installation area of via the ventilation system.
International standards are being drafted and, for sterilizers, specify the following:

- A ventilation monitor shall be fitted in the ventilation system, i.e. where the ventilation ducts from the sterilizer are connected to it. The monitor shall have a battery-powered alarm device to provide an acoustic and optical signal to warn personnel in the immediate vicinity of the sterilizer if the ventilation system has failed. In addition, the monitor shall be fitted with a potential-free contact that interrupts the circuit in the event of ventilation failure. This contact can be connected to the sterilizer control system, which can use it to stop, or prevent the start of, a sterilization process.
- A cover shall be provided immediately over the floor drain, and shall be connected to the ventilation system as monitored by the ventilation monitor.

JAX032 . . . . . Formaldehyde sterilizær. Hospital division

Special advice for formaldehyde sterilizers

Formaldehyde sterilizers are equipped with a ventilator removing formaldehyde residuals from such spots of the equipment from where it may be spread to the surroundings. Because this ventilator creates a slight pressure raise in the exhaust tube, it may if connected to the building ventilation system, in case its ventilator stops, spread odour to spaces normally evacuated by the system. Therefore there are two alternatives of using the sterilizer ventilator.

- Connect the sterilizer ventilator exhaust to the building ventilator system, but disconnect the sterilizer fan motor electric power.
- Arrange for a separate ventilator tube from the sterilizer ventilator to the open air, where it should terminate distant from windows, air intakes etc.

JAX057 . . . . . Drain, GEE

Drain

The drainage from the gas separator tank contains ethylene glycol and solved ethylene oxide. The drain should be collected and disposed of in accordance with local regulations.

JAX066 . . . . . Gas discharges GEE

Gas discharges

Observe the following points where gas discharges are concerned:

- local and national environmental regulations

- local and national fire regulations
- pipework falls and draining
- pipe dimensions, for pressure drop

Regulations
Where there are no applicable environmental or fire regulations, Getinge AB recommends that the gas be destroyed in an effective manner, for example by combustion or catalytic oxidation, before it is passed to the open air.The opening of the pipe shall in all circumstances be well protected from rain and snow, for example by being terminated with a downward bend.

The outlet must be positioned at least 7.5 metres from windows, air intakes and places where people are or may be present. Prevailing wind conditions must also be borne in mind.

Pipe slope
The gas exhaust pipe, from the gas separator tank, shall be a gastight pipe. It shall slope at least 2% backwards to the gas separator tank. If pockets can not be avoided, those pockets must be drained of.

Pipe dimension
The diameter of the pipe for the exhausted gas, from the gas separator tank, must not be less than the connection on the separator tank itself. To keep the pressure in the separator tank below 10 kPa (0.1 bar) following pipe diameters are recommended:

Separator connection size: DN 50

Pipe Size No	50	63	80
Length m	25	80	250

Separator connection size: DN 80

Pipe Size No	80	100	125
Length m	25	80	250

Any additional device in the exhaust pipe system must not reduce the gas flow from the gas separator tank.

Ventilation

The start of a sterilizing process should be blocked by a flow monitor when the ventilating system is not switched on or out of order.

Loading side

The room should be ventilated with an air change of at least 10 times per hour. The air should flow diagonally in the direction from the ceiling towards the floor, in such a way as to make polluted air move away from the operator.

Unloading side

The room should be ventilated with an air change rate of at least 10 times per hour. The air should flow diagonally in the direction from the ceiling towards the floor, in such a way as to make polluted air move away from the operator.

Service room

A (conical) ventilating hood with a diameter bigger than the floor gutter, should be arranged about 12 mm above the latter, connected to a ventilating pipe with a capacity to serve as common ventilation for the entire service room, where the air should change at least 10 times per hour. Air inlet should be placed at the service room ceiling.

The exhaust ramp above the unloading door should be connected to the ventilating pipe above.

Gas bottle storage room

The room should be ventilated with an air change rate of at least 10 times per hour. The air should flow diagonally in the direction from the ceiling towards the floor, in such a way as to make polluted air move away from the operator.

JAX120 . . . . . Checking by authorities connection and drainage

Checking by authorities

The user of the sterilizer must, on installing the unit, inform the appropriate authorities that this has been done and also comply with loca restrictions on the connection of water, drainage and ventilation. There

are often local restrictions on connection to the drinking-water mains, on how wastewater is to be treated and how ventilation is to be arranged. This is particularly important when installing sterilizers for formalin sterilization or ethylene oxide sterilization as limit values for emissions may have to be complied with.

JAX078 . . . . . Function monitoring. Hospital division

Functional check-up prior to use

- This function check must be carried out by a skilled technician.
- For sterilizers that are to be validated under European Standards, the function check must be based on instructions according to EN554.
- The user should set up a routine for continuous tests of the sterilizer.

JAX033 . . . . . Functional check-up. Hospital division

Functional check-up prior to use

- This function check must be carried out by a skilled technician.
- For sterilizers that are to be validated under European Standards, the function check must be based on instructions according to EN555.
- The user should set up a routine for continuous tests of the sterilizer.

JAH002 . . . . . Special advice GED formaldehyde and without discard filter

Special advice for formaldehyde sterilizers and GED without discard filter

Formaldehyde sterilizers and GED's without discard filter are equipped with a gas separator removing gas from the vacuumpump outlet.

Arrange for a separate ventilator tube from the gas outlet of the gas separator to the open air, where it should terminate distant from windows, air intakes etc.

Prior to use

The identification letters (A, B, C etc.) used below are shown in the piping diagram and the valves themselves are marked with the corresponding letter.

- Put a test pressure 8 -10 bar on the pipe connecting the gas bottle and the sterilizer and check for leaks. Blow through afterwards with nitrogen.
- Make a functional test of the ventilation flow monitor.
- Open the valves for compressed air, water and steam.
- Open all door and jacket channel valves E.
- Fill doors, evaporator and jacket with water by opening the valves A, B and C. Open the airing valves fitted on top of each channel and the pipe work until water trickles out.
- Shut valve A when the water has reached 50 mm up in the expansion tank sight-glass.
- Fill manually, using valve G, the recirculation tank with water to 2/3 of the total height of the sight glass. Excess water will be drained off when the control device starts working.
- Switch on electric power.
- Check with a brief manually operation of the pump contactor(s) that the motor direction of rotation conforms with the arrows on the pump housing. Interchange two sterilizer supply wires to reverse direction of rotation when required.
- Check that the vacuum pump sucks sealing water when starting.
- Do not keep the vacuum pump running dry more than a few seconds.
- Start heating the jacket by pushing the button Jacket heat in the control panel.
- Check the thermometers of jacket and door. Close the appropriate channel-group valve E about 1/4 of a turn to the group showing the highest temperature. Wait 1/4 to 1/2 hour before repeated adjustments are made.
- Check that the door(s) can be opened and closed without interference between the door(s) and associated front panels.
- Check the installation and sterilizer for leaks.
- Check and adjust if necessary the air leak and sealing water flow to the vacuum pump.
- Run all processes while checking pressures temperatures, times and function of signal lights.

Set points will be found in the Phase list, page ”Parameter description”. File the recorder chart.

LAX013 . . . . . Ge 2066 prior to use

Prior to use

Prior to use, check that all service media are correct connected at their dedicated connection points.

LAX014 . . . . . 2066 with program controlled by a pressure switch

If the sterilizer is installed at a very high altitude, it may be necessary to adjust the setting of the pressure switch that indicates the -0.85 bar negative pressure. This is because the pressure switch senses the pressure in relation to atmospheric pressure, i.e. the measured pressure is always related to the atmospheric pressure.
Adjustment should be considered if the mean atmospheric pressure at the site is less than 950 mbar(a).

LAX015 . . . . . 2066 with supervisor 2 and 3.

If the sterilizer is installed at a high altitude, it will be necessary to adjust certain pressure limits in order to maintain integrity of the independent monitoring of door safety.

- This adjustment is motivated by the fact that the independent pressure reading is related to absolute pressure, i.e. the setting is always expressed in relation to absolute vacuum
  This means that the duplicated door safety function's independent pressure window and monitoring of these functions can be too high relative to the ambient atmospheric pressure.
  Adjustment should be considered if the mean atmospheric pressure at the site is less than 925 mbar(a). Contact Getinge for more information.

LAX016 . . . . . Sterilizer with METRA printer

- Remove the transport brace from the METRA printer. See also the COMPONENTS chapter.

LAX017 . . . . . 2066 General

- Check that the guidelines given in the installation instructions for the connection of electricity, water, compressed air, drainage, ventilation and - where appropriate - steam, are fulfilled.
- Check that the operating instructions are displayed in the vicinity of the sterilizer.
- Make any custom modifications to the sterilizer. See the “Functions that can be programmed by the user” section in the GENERAL ADVICE chapter.
- Check that all electric terminal screws are properly tightened, paying particular attention to power connections.
- Open the valves for compressed air, cold water and, where appropriate, steam.

LAX021 . . . . . 2044 General

- Check that the guidelines of the installation instruction regarding the connection of electricity, water, drains, ventilation and where appropriate also steam and air are complied with.
- Check that operating instructions are displayed at the sterilizer.
- Carry out any customer adjustments required on the sterilizer. See the section headed “Functions which can be programmed by the user” in the chapter on ADVICE AND INSTRUCTIONS.
- Check that all the connecting screws belonging to electric cables are sufficiently tightened. Pay particular attention to power lines.
- Open the taps for cold water and where appropriate steam and air.

LAX001 . . . . . All sterilizers

Prior to use

Prior to use, check that all service media are correct connected at their dedicated connection points.

- Check that all electric wire connection screws are tightened.
- Open the valves for compressed air, water and steam.

LAX010 . . . . . GEE, general

- Make sure that the pipe connecting the gas bottle with the sterilizer is tight by putting a test pressure of 8 -10 bar on it and check for leaks. Blow through afterwards with nitrogen.

- Make a functional test of the ventilation system in the building.
- Open all door and jacket channel valves ”E” (*see piping diagram*).
- Fill doors, evaporator and jacket with water by opening the valves ”A”, ”B” and ”C”.
- Open the airing valves fitted on top of each channel and the pipe work until water flows out.
- The circulation pump must not be running during the ventilation period.
- Fill manually, using valve ”G”, the recirculation tank with water to 2/3 of the total height of the sight glass. Excess water will be drained off when the control device starts working.
- Switch on electric power.

LAX002 . . . . . E-version or with vacuumpump Not GEE

- Check that the water tank level is about 13 mm (1/2”) below the spill way. Adjust if necessary on the float valve.
- Check that the feed water enters at least 20 mm above the overflow level.

LAX003 . . . . . Sterilizer with vacuumpump Not GEE

- When the feed water tank is filled with water, check by a brief hand operation of the direct on line starter that the direction of the rotation of the pump conforms with the arrow on the pump housing. Change any two of the main supply cables at their connection terminals to reverse the direction of rotation.
- If the vacuum pump will not immediately suck sealing water when it starts, fill the feed water tank to the brim by blocking the spill way and pressing down the float. It may also become necessary to fully open the water flow valve to the pump until this sucks water, whereupon it should be reset to ensure the correct flow.

Do not let the pump run dry more than a few seconds.

- Should the vacuum pump be stuck loosen it according to instructions given under the heading Vacuumpump in the chapter Components.

LAX011 . . . . . GEE, general

- Start heating the jacket by pushing the button ”Jacket heat” in the control panel.
- Check the thermometers of jacket and door. Close the appropriate channel group valve ”E” about 1/4 of a turn to the group showing the highest temperature. Wait 1/4 to 1/2 hour before repeated adjustments are made.

LAX004 . . . . . E-version

- Drain off the steam generator water first filled as it contains chemical feed water pump shipping preservatives.

LAA004 . . . . . 2066 E-version

- If the steam generator has been subjected to temperatures of -10 °C or below during transport or storage, its temperature protection device must be reset.
- When delivered, the feed water pump is filled with a preservative chemical. It must not be pumped into the steam generator, as this would affect correct operation of the level control.
  - Check that the water supply is connected to the feed water tank.
  - Remove the pipe from the outlet of the pump and connect a hose to it.
  - Run the hose to a floor drain, start the pump manually and run it until the water flowing from the hose is clean.
- Check that the correct type of level control relay is fitted. The type of relay and its setting depend on the quality of the water. See 'Steam generator adjustment and controls' in the ADVICE AND INSTRUCTIONS chapter.
- When starting, the 'Steam generator fault' alarm will be generated after a while. Acknowledge the alarm on the operator's panel and then fill the steam generator to the correct water level using the 'Reset level' pushbutton. See the 'Steam generator' section in the ADVICE AND INSTRUCTIONS chapter.
- If the feed water pump does not immediately suck water when it is started, fill the feed water tank to overflowing by covering the overflow pipe and pressing down the ball valve

Do not let the feed water pump run dry for more than a few seconds.

- If the pump has seized, disconnect the electrical supply and remove the pump impeller. This is described in the COMPONENTS chapter.
- In particularly unfavourable cases, the power tolerance of the heater and the mains voltage tolerance may combine such that even a correctly rated main fuse is overloaded and blows. Should this occur, one heater in the steam generator can be disconnected while retaining the rated power.
- Check that the steam generator level control system is working properly.

- Check that the pressure switch is working within the pressure limits shown on the electrical circuit diagram.

Residual current device

If a residual current device (RCD) is fitted, it may trip when the steam generator is started if the generator has been out of use for some time and stored in a damp environment. This is due to absorption of moisture that reduces the insulation resistance of the element insulation.

- Remove the elements as described under “Replacement of electric elements” in the COMPONENTS chapter.
- Dry the elements for about 24 hours at a temperature of 150 °C and refit as described in “Replacement of electric elements”.

LAA005 . . . . . 2044 E-version

- If the steam generator has been exposed to temperatures of -10°C or lower during transport or storage, its temperature protection must be reset.
- The feed water pump is preserved with a chemical on delivery. This must not be pumped into the steam generator as it affects the level-checking function.
  - Check that water is connected to the feed water tank.
  - Disconnect the pipe on the outlet of the pump and connect a hose to this.
  - Route the hose to a floor drain, start the pump manually and run it until the water emerging from the hose is clean.
- Check that the correct type of level relay is fitted. The type of level relay and its setting depend on the nature of the water. See “Steam generator settings and checks” in the chapter on ADVICE AND INSTRUCTIONS.
- The “Steam generator fault” alarm is obtained on start-up after a short time. See the section headed “Steam generator” in the chapter on ADVICE AND INSTRUCTIONS.
- If the feed water pump does not immediately draw water when it is started, fill the feed water tank to the brim by covering the overflow and pressing down the float.

Do not allow the pump to run dry for more than a few seconds.

- If the pump has jammed, turn off the power supply and remove the impeller. The procedure to be followed is described separately in the chapter on COMPONENTS.

- Check that the level regulation works correctly.
- Check that the pressure switch operates within the pressure limits stated on the wiring diagram.

Earth-fault switch

When an earth-fault switch is installed, this may be tripped on start-up after a prolonged stoppage if the device has been kept in a damp environment. This is due to the uptake of moisture which reduces the insulation resistance in the insulation of the elements.

- Disassemble the elements in accordance with the instructions under the heading of “Replacing electrical elements” in the chapter on COMPONENTS.
- Dry the elements for approx. 24 hours at 150°C and refit in accordance with the instructions on “Replacing electrical elements”.

LAA003 . . . . . 2066 with steam converter

- On starting, the “Steam generator fault” alarm is given.
  Acknowledge the alarm on the operator panel.
  Water filling continues automatically until the correct water level is reached, when the “Steam generator level” LED lights up.
- If the feed water pump does not immediately suck water when it is started, fill the feed water tank to overflowing by covering the overflow pipe and pressing down the ball valve

Do not let the feed water pump run dry for more than a few seconds.

- If the pump has seized, disconnect the electrical supply and remove the pump impeller. This is described in the COMPONENTS chapter.
- Drain off the first filling of water in the steam generator, as this contains chemicals with which the feed water pump has been protected. Repeat the alarm acknowledgement and refilling procedure.
- Check that the steam generator level control system is working properly.
- Check that the reducing valve for primary steam is set to 2.8 bar(e).

LAX005 . . . . . General

- Check the safety valves by turning their knurled cap one turn anti-clockwise when they are pressurized. Steam or air should blow out.

Use protective gloves. Blowing steam and hot knurled cap can cause burns.

- Check for leakage on both supply pipes and sterilizer, for cabinet types while the cover plates are removed.
- Check the door (doors) according to instructions given under the headline ”Door” in the service manual.

LAX018 . . . . . Sterilizer with vacuum pump, without ECO system

- Check and, if necessary, adjust the supply of sealing water and leak air to the vacuum pump. See the “Vacuum pump” section in the COMPONENTS chapter.

LAX019 . . . . . Sterilizer with vacuum pump and ECO system

- Check and, if necessary, adjust the supply of sealing water and leak air to the vacuum pump. See under the heading “ECO-water conservation system” in the MAINTENANCE chapter for adjustment of the sealing water, and under “Vacuum pump” in the COMPONENTS chapter for adjustment of the leak air.

LAX020 . . . . . General, safety checks

- Perform all safety checks as described in the GENERAL ADVICE and The Door chapters.

LAX006 . . . . . Sterilizer with vacuumpump

- Check and adjust if necessary the air leak and sealing water flow to the vacuum pump.

LAX008 . . . . . GEV general

- Check the fans for correct direction of rotation. When observed from inside the camber, they should rotate anti-clockwise. Change any two of the main supply cables at their connection terminals to reverse the direction of rotation.
- Check that, during cycle condensate drops into the overflow cups on the fan shaft seal. The rate should be a minimum of 5 drops/ second (200 ml/m).

LAX022 . . . . . Function test on GE-lab fan

- Check, without activating the fan motor, that the fan impeller rotates freely and easily. When the fan impeller is rotated, the motor shaft must rotate with it.

LAX009 . . . . . GEC general

- Check that the direction of the rotation of the pump conforms with the arrow on the pump housing. Before testing the circulation pump remove the strainer in the chamber bottom and fill the pump with water.
  Change any two of the main supply cables at their connection terminals to reverse the direction of rotation.

LAX007 . . . . . General

- Run all processes while checking pressure temperatures, times and function of signal lights. Set points will be found in the phase list. File the recorder chart.

LAX012 . . . . . General Hospital div.

Prior to use, check that all service media are correct connected at their dedicated connection points.

- Open the cold water valves and, where appropriate the steam and air valves.
- Check that the water tank level is about 13 mm (1/2”) below the spill way. Adjust if necessary on the float valve.
- Check that the feed water enters at least 20 mm above the overflow level.
- If the vacuum pump will not immediately suck sealing water when it starts, fill the feed water tank to the brim by blocking the spill way and pressing down the float. It may also become necessary to fully open the water flow valve to the pump until this sucks water, whereupon it should be reset to ensure the correct flow.

Do not let the pump run dry more than a few seconds.

- With steam generator equipped sterilizers, drain off the steam generator water first filled containing chemical feed water pump shipping preservatives.
- Check the safety valves by turning their knurled cap one turn anticlockwise when they are pressurized. Steam should blow out.

Use protective gloves. Blowing steam and hot knurled cap can cause burns.

- Check for leakage on both supply pipes and sterilizer, for cabinet types while the cover plates are removed.
- Check the door (doors) according to instructions given under the headline “Door” in the sterilizer manual.
- Check and adjust if necessary the air leak and sealing water flow to the vacuum pump.
- Run all processes while checking pressure temperatures, times and function of signal lights. Set points will be found in the “Apparatus specification”. File the recorder chart.

MAINTENANCE

To be made by trained technicians only

NAX096 . . . . . ESD in maintenance and servicing general

ESD (Electrostatic discharge)

ESD damage in installation and servicing may destroy the electronic equipment. Read the instructions in the ESD section in the INSTALLATION chapter BEFORE starting work.

NAX029 . . . . . General

Safety devices, a survey

The panels of the sterilizer shall prevent the operator access to the inner parts of the sterilizer. Only specially trained personnel have access to the inner parts.

Safety components

Every sterilizer is equipped with a number of components the purpose of which is to specifically guarantee the human safety. These items are marked with the sign below in:

- Electric diagrams
- P/I diagrams
- Spare part lists

These components have been subject to special tests before accepted as safety components and must therefore not be substituted by any make or execution not approved by GETINGE AB. It is of greatest importance that these components are kept in good working order to maintain a safe function during the sterilizer life time. The signs are used not only to point out important components, but also to emphasize such other safety factors requiring special attention as measurements, tolerances, material etc.

NAX045 . . . . . Supervisor

Independent Supervisor

Besides the PACS 2000 control system, the sterilizer is equipped with a PACS Supervisor.

The Supervisor is using an independent pressure transmitter to manage the chamber pressure. The supervisor will block the door from opening should the pressure in the chamber be too high.

This system is further explained in chapter ”Door” under headline ”Safety blocking of the door opening”.

NAX061. . . . . GE 2066 Supervisor 1 and 2

Independent Supervisor

Besides the PACS 2000 control system, the sterilizer is equipped with a PACS Supervisor.

The Supervisor is using an independent pressure transmitter to manage the chamber pressure. The supervisor will block the door fro opening should the pressure in the chamber be too high.

The general features of this system are described in the chapter on the CONTROL UNIT PACS 2000, with pressure monitoring described under the “Safety interlocking of door opening” heading in the The Door chapter.

NAX046. . . . . Supervisor, with load temp

The supervisor is also equipped with an or more independent load temperature sensors. If the determined temperature in the load is too high, the Supervisor will force the PACS2000 to continue the cooling.

The cooling will continue even if the sensors connected to the PACS 2000 indicates low temperatures. In such a case there will be an informative alarm ”Loadtemp diff”.

NAX062. . . . . Supervisor, with load temp

The supervisor is also equipped with an or more independent load temperature sensors. If the determined temperature in the load is too high, the Supervisor will force the PACS2000 to continue the cooling.

The cooling will continue even if the sensors connected to the PACS 2000 indicates low temperatures. Temperature supervision is described in more detail under the “Monitoring of load temperature during liquid sterilization” heading in the GENERAL ADVICE chapter.

NAX047. . . . . Supervisor, GEC

Beside the load temperature the temperature of the recirculation process water is monitored by the Supervisor. The PACS2000 control system

will continue the cooling should the temperature of the recirculating water be too high.

NAX025 . . . . . GEE, General

Personnel performing maintenance on ethylene oxide sterilizers shall have at least the same basic knowledge about ethylene oxide sterilization and the execution of the actual plant as are required from the operator.

Check that the ventilation system is working while opening pipe connections or replacing components in the pipe system.

AX097 . . . . . General requirements in service and maintenance.

General

Be aware of the risks of crushing, cuts and burns and the risks of live equipment when working behind fronts and panels.

The need for maintenance depends chiefly on the extent to which the sterilizer is used. How often action has to be taken for preventive purposes consequently varies from one case to another. If the sterilizer is used to its full capacity, increased maintenance may be required.

Getinge AB only accepts responsibility for product safety and where appropriate also CE marking if the following minimum requirements are met by the user.

- The sterilizer has been installed in accordance with Getinge's instructions and drawings.
- Operators and maintenance personnel have been trained for their tasks. Getinge AB can offer such training.
- Consumables, spare parts and accessories which are used must be approved by Getinge AB.
- Maintenance of the equipment must comply with the maintenance schedule in the SERVICE MANUAL or be carried out more often.
- Any modifications must be approved and documented by Getinge AB and carried out by authorised personnel.

NAX063. . . . . After commissioning

After commissioning

After one month's operation, deposits and particles of dirt from new pipes will have collected in filters and sensitive components. If they are not removed, they will result in reliability problems, leaks and reduced performance.

- Clean all filters, including the plastic strainers in the cooling water and float valve inlets.
- Check that all flow rates are correct, and rectify them if not. See the “Heat exchanger” section in the COMPONENTS chapter.
- Clean all steam traps. Remove deposits on their seats and floats.
- Check that all pipe joints in ancillary services and the sterilizer are tight.
- Check that all electric terminal screws are properly tightened, particularly on power connections.

NAH008 . . . . . After start-up, sideways-opening, hospital

After start-up

After one month of operation coatings and particles from new pipes have built up in filters and sensitive components. If no action is taken to deal with these build-ups, the result is stoppages, leaks and reduced performance.

- Clean all dirt filters including the plastic screen in the inlet of the float valve.
- Carry out a flow check and take action if the result is not satisfactory. See the sub-section on "Heat exchangers" in the section on COMPONENTS.
- Clean all steam traps. Remove coatings on the seat and ball of these.
- Check that the pipe system of the installation and autoclave is leak-tight.
- Check that all the electrical connection screws are tightened on power leads.

Maintenance plan

NAX034 . . . . . Once a week

Once a week

NAX003 . . . . . Sterilizer with steam generator

- Clean the steam generator of steam generator equipped sterilizers by blowing down its content through the drainage valve while the pressure gauge STEAM SUPPLY is about 10 kPa (1,5 psig).

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

If the feed water has been softened or deionized, this item can be changed to monthly maintenance.

NAA004 . . . . . New steam generator, ordinary /softened water, manual blowdown

- Clean the steam generator of steam generator equipped sterilizers by blowing down its content through the drainage valve while the pressure gauge STEAM SUPPLY is about 10 kPa (1,5 psig). Make sure that the steam generator is completely emptied.
- Turn on the control current power supply, acknowledge the alarm and refill the steam generator after it has emptied.
  See also under the “Care of the steam generator” heading in the GENERAL ADVICE chapter.

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

NAA014 . . . . . Steam converter, normal/softened water, manual blowoff

- Clean the steam generator of steam generator equipped sterilizers by blowing down its content through the drainage valve while the pres-

sure gauge STEAM SUPPLY is about 10 kPa (1,5 psig). Make sure that the steam generator is completely emptied.

- Switch on the operating current, acknowledge the alarm and check that the boiler fills up again. The “Steam generator level” LED lights up.
  See also under the “Care of the steam generator” heading in the GENERAL ADVICE chapter.

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

NAA005. . . . . New steam generator, ordinary /softened water, automatic blowdown

- Empty the steam generator when the steam supply pressure gauge shows 0.1-0.5 bar by opening the blowdown valve manually by means of its pilot valve, or from the operator's control panel. The steam generator must be completely emptied.
- Acknowledge the alarm and refill the steam generator after it has emptied.
- See also under the “Care of the steam generator” heading in the GENERAL ADVICE chapter.

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

NAA006. . . . . New steam generator. Testing the boil-dry protection

- Test operation of the boil-dry protection by pressing the ***Test level switch*** push-button. See also under the “Steam generator settings and controls” heading in the GENERAL ADVICE chapter.

NAX026. . . . . GEE, General

- Check the air-in filter for a tight and rigid attachment.
- Check by means of the appropriate sight glasses that the recirculation and expansion tank contain sufficient amount of water.

NAV007. . . . . Sterilizer with automatic, vertically operating door

- Check that the door closing motion can be stopped by gently pushing, the squeeze protection plate in the door anti-motion direction.

NAX004. . . . . GE sterilizers

- Check the air-in filter for a tight and rigid attachment.

NAX058 . . . . . GE sterilizers

Replacing the air filter

Depending on the size of the sterilizer, the filter shall be replaced after a certain number of cycles calculated from the following formula, or when the pressure equalization takes too long time.
However, the filter shall be changed at least once a year.

NAX022 . . . . . Sterilizer with air-in filter from St. Kopparberg (blue filter units)

Number of cycles = 170.000 / (N*V)

N= Number of filter elements.
V= Chamber volume in litres.

NAX059 . . . . . Sterilizer with PALL-filter

Number of cycles = 1.500.000 * N^2/V

N = Number of filter elements
V = Chamber volume in litres

The filter units has to be replaced more often if the environment is damp or dusty.

NAX094 . . . . . Sterilizer with Sartorius 5” air-in filter

Number of cycles = 15.000.000 * N^2/V

N = Number of filter elements
V = Chamber volume in litres

The filter units has to be replaced more often if the environment is damp or dusty.

NAX095 . . . . . Sterilizer with Sartorius 10” air-in filter

Number of cycles = 70.000.000 * N^2/V

N = Number of filter elements
V = Chamber volume in litres

The filter units has to be replaced more often if the environment is damp or dusty.

NAX060 . . . . . Sterilizer with Kopparberg filter

Number of cycles = 3.000.000 * N^2/V

N = Number of filter elements
V = Chamber volume in litres

The filter units has to be replaced more often if the environment is damp or dusty.

NAH007 . . . . . Autoclaves with air filter from S:t Kopparberg

Number of cycles= 150 000 * N / V

N = Number of filter elements
V = Chamber volume, in litres

The filter should be replaced more often in a damp and/or dusty environment.

NAX036. . . . . Air-in filter. GE2044

- Check the air - in filter for a tight and rigid attachment.

Replacing the air-in filter

Depending on the size of the sterilizer, the filter shall be replaced after a certain number of cycles, see below. The filter should be changed more frequently if the air contains high amount of particles or humidity.

GE 446: 600 cycles

GE 449: 250 cycles

NAX065. . . . . Air-in filter. GE2066

- Check the air - in filter for a tight and rigid attachment.

Replacing the air-in filter

Depending on the size of the sterilizer, the filter shall be replaced after a certain number of cycles, see below. The filter should be changed more frequently if the air contains high amount of particles or humidity.

GE 2606: 300 cycles

GE 2609: 275 cycles

GE 2612: 250 cycles

GE 2617: 200 cycles

NAX049. . . . . Air-in filter formaldehyde

Due to the large number of air pulses a formaldehyde process should be considered as eight normal steam processes.

NAX050 . . . . . Drain filter/GED

Replacement of the drain filter

The drain filter is exposed to disinfection temperatures, which may cause the material of the filter cartridge to break down.

Getinge AB recommends that the filter be replaced every 200th cycle.

NAX092 . . . . . Changing killingfilter, after NAX050

Replacing killing filter

The killing filter should be replaced after killing programs have been running for approximately 100 hours.
If the replacement is made after a correctly performed killing process (no alarm and no manual stepping through the program), the filter is sterilized and can be handled without risk.

NAX005 . . . . . General

Monthly

- Check the door seal. If needed, lubricate as described in chapter THE DOOR.
- Check ink ribbon/pens of the printer/recorder and replace if necessary

NAH006 . . . . . General

Every month

- Check the door seal. Lubricate or replace the sealing where necessary. See the section on DOOR.
- Check that printer pens and/or ink ribbons are working. Replace if necessary.

- Carry out safety checks in accordance with the instructions under the heading of "Protection against crushing and movement of the door" in the section on DOOR.

NAA009. . . . . . New steam generator, de-ionised water,manual blowdown

- Empty the steam generator by turning off the control power supply and opening the drain valve slowly when the steam supply pressure gauge shows about 0.1 bar. Empty the steam generator completely.
- Turn on the control current power supply, acknowledge the alarm and refill the steam generator after it has emptied. See also under the “Care of the steam generator” heading in the GENERAL ADVICE chapter.

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

NAH003 . . . . . Sterilizer with automatic, horizontally operated door

- Make the safety check as described in *Squeeze protection and door motion* in the chapter Door.

NAX093. . . . . GEE-Service fan motor

- Service shall be conducted on the fan motor every 1000 hours, see “Components”. If the quality of the compressed air differs from the quality stated in “Installation: Compressed Air” more frequent service may be required.

NAX006. . . . . General

After the first month of operation

- Clean all filters and strainers.
- Clean all steam traps.

NAX019. . . . . Sterilizer with vacuumpump Not GEE

- Perform a leak rate test using the appropriate program. See Users Manual.

NAX066 . . . . . Every three months

Every three months

NAA007 . . . . . Safety pressure switch, new steam generator

Use the ***Test pressure limiter*** key switch to raise the pressure in the steam generator (i.e. not under the control of the pressure regulator) when testing either operation of the safety pressure switch or the operation and settings of the safety valves.

NOTE:

The key for this switch must be kept by the person responsible for operation of the plant.
The operating pressure of the safety pressure switch (NOT THE NORMAL OPERATING PRESSURE PRESSURE SWITCH) must be increased before testing the safety valves.

On conclusion of the test, the pressure setting of the safety pressure switch must be reset to 3 bar, and its correct operation at this pressure must be tested.

See also under the “Steam generator settings and controls” heading in the GENERAL ADVICE chapter.

NAA018 . . . . . Quarterly inspection, new steam generator

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

- Check operation of the steam generator safety valve as follows.
  - Turn the Test pressure limiter key switch to the Test position (l) to apply maximum power to the steam generator heating elements (i.e. not controlled automatically by the control system). (The switch is fitted on the exterior of the electrical connection cubicle.) Watch the pressure rise on the steam supply pressure gauge. The safety valve should start to lift at 3.5 ± 0.14 bar. The pres-

sure, when the valve is blowing fully, must never exceed 3.85 bar. Replace the safety valve if this condition is not fulfilled.

Turn the key switch immediately to the (0) position if the safety valve does not open or if the pressure tends to exceed 3.85 bar for any reason.

- Turn the key switch to the normal operating position (0) and remove the key.
- Check that the safety valve is not leaking any steam and that its lead seal is intact.

NOTE:
When testing operation of the safety valve, there is a risk of the overheating protection device operating, due to the fact that the test is performed close to the device's operating temperature. If the protection operates, it can be reset manually.

- Check the performance of the chamber safety valve as follows.
  - Start a process having a high sterilization temperature and wait for it to reach the sterilization phase. Turn the Test pressure limiter key switch to the Test position (l) during the sterilization phase to apply maximum power to the steam generator heating elements (i.e. not controlled automatically by the control system). Watch the pressure rise on the steam supply pressure gauge. Turn the switch to the normal operating position (o) at a pressure immediately below 3.5 bar.
  - Operate the pilot valve for the chamber steam valve manually and watch the pressure rise on the Chamber pressure pressure gauge. Acknowledge the temperature alarm if it operates. The safety valve should start to lift at 3.0 ± 0.14 bar. The pressure, when the valve is blowing fully, must never exceed 3.3 bar. Replace the safety valve if this condition is not fulfilled.

Return the pilot valve immediately to the normal operating position if the safety valve does not open or if the pressure tends to exceed 3.3 bar for any reason.

- Return the pilot valve to its normal operating position and terminate the process.
- Check that the safety valve is not leaking any steam and that its lead seal is intact.

- During operation, check that the steam generator contactor marked 'Min.' on the circuit diagram is maintaining the steam pressure. If, instead, it is the contactor marked 'Max.' on the circuit diagram that is maintaining the steam pressure, there is a component fault that can threaten the reliability and life of the pressure switch.
- Perform the following steps during normal operation when using a steam generator fitted with a sight glass:
  - Close the upper sight glass valve.
  - Briefly open the sight glass drain valve.
  - Close the lower sight glass valve and open the upper valve.
  - Briefly open the sight glass drain valve.
  - Open the lower sight glass valve.

Beware the risk of scalding or hearing damage from blowing steam.

Depending on operating conditions, it may be necessary to clean the steam generator at shorter intervals than three months.

- Check that the steam generator pressure regulator is operating between the limits shown on the electrical circuit diagram.
- Check that the boil-dry protection of the steam generator is operating correctly.
- Check, using the control power supply switch, that the safety contactors can be heard operating.

For details of performing these two checks, see under the 'Steam generator settings and controls' heading in the GENERAL ADVICE chapter.

NAA022 . . . . . Quarterly check, new steam generator??

Steam blowing out is always dangerous and may cause burns. The noise levels may cause damage to hearing.

- Check the operation of the steam generator safety valve as follows.
  - Set the key switch ***Test pressure limiter*** to the test position (l) so that the element of the steam generator is subjected to unregulated maximum power. (The switch is mounted on the outside of the electrical junction box). Monitor the rise in pressure on the pressure gauge ***Steam supply.*** The blow-off of steam must start at 3.5 ± 0.14 bar. The pressure at full blow-off must never rise above

3.85 bar. ***If the safety valve does not meet these requirements, it must be replaced..***

Reset the key switch immediately to (o) if the safety valve does not open or the pressure for some other reason tends to exceed 3.85 bar.

- Reset the key switch to operating position (o) and remove the key.
- Check that the safety valve is leaktight and that its lead seal is intact.

IMPORTANT: There is a risk in function testing of the overheating protection being tripped because the test is carried out close to the set temperature of the protection. The protection can be reset manually.

- Check the function of the safety valve of the chamber and jacket as follows.
  - Start a process at high sterilization temperature and wait for the sterilization phase. Set the key switch ***Test pressure limiter*** in the test position (●) during the sterilization phase, so that the element of the steam generator is subjected to unregulated maximum power. Monitor the rise in pressure on the pressure gauge ***Steam supply.*** Reset to operating position (o) just below 3.5 bar.
  - Operate manually the pilot valve to the steam valve of the chamber or jacket and monitor the rise in pressure on the pressure gauge Chamber pressure or Jacket pressure. Acknowledge the alarm for temperature fault if it trips. The blow-off of steam must start at 3.0 ± 0.14 bar. The pressure must never exceed 3.3 bar at full blow-off. ***If the safety valve does not fulfil these requirements, it must be replaced***.

Immediately reset the pilot valve to the operating position if the safety valve does not open or the pressure for some other reason tends to exceed 3.3 bar.

  - Reset the pilot valve to the operating position and terminate the process.
  - Check that the safety valve is leaktight and that its lead seal is intact.
- Check during operation that the contactor of the steam generator marked "Min" on the circuit diagram deals with pressure regulation. If it is found that the pressure regulation is attended to by the contac-

tor marked "Max" on the circuit diagram, there is a component fault which may adversely affect the reliability and life of the pressure switch.

- Carry out the following during operation with a steam generator which has a water-level stand:
  - Close the upper sight-glass valve.
  - Open the tapping valve of the sight glass briefly.
  - Close the lower sight-glass valve and open the upper one.
  - Open the tapping valve of the sight glass briefly.
  - Open the lower sight-glass valve.

Beware of the risk of steam flowing out causing burns and noise-induced damage.

In some operating conditions cleaning may also be needed between the prescribed three-monthly intervals.

- Check that the pressure of the steam generator is regulated between the limits indicated on the wiring diagram.
- Carry out a safety check on the boil-dry protection of the steam generator.
- Using the operating switch, check that the safety contacts go on and off.

Further information on the last two checks mentioned is provided under the heading of "Settings and checks for the steam generator" in the section entitled GENERAL ADVICE.

NAA021 . . . . . Quarterly check 19kW steam generator

Steam blown out always poses a hazard and can cause burns. The sound levels can cause damage to hearing.

- Check the operation of the steam generator's safety valve as follows.
  - Set the key switch ***Test pressure limiter*** to the test position (•) so that unregulated maximum power is applied to the elements of the steam generator. (The switch is mounted on the outside of the electrical junction box). Follow the rise in pressure on the ***Steam supply*** pressure gauge. Steam must start to blow off at 3.5±0.14

bar. The pressure must never rise above 3.85 bar in full blow-off.
If the safety valve does not fulfil these requirements, replace it.

Immediately reset the key switch to (o) if the safety valve fails to open or the pressure for some other reason tends to exceed 3.85 bar.

- Reset the key switch to operating position (o) and remove the key.
- Check that the safety valve is leaktight and that its sealing is intact.

IMPORTANT!

When testing operation there is a risk of the overheating protection being tripped because the test is performed close to its set temperature. The protection can be reset manually.

- Check during operation that the contactor of the steam generator marked “Min” on the circuit diagram takes care of pressure regulation. If the contactor “Max” marked on the circuit diagram deals with the regulation instead, there is a component fault which may jeopardise the reliability and life of the pressure switch.
- Carry out the following during operation with a steam generator fitted with a water level stand:
  - Close the upper inspection glass valve.
  - Briefly open the drain valve of the inspection glass.
  - Close the lower inspection glass valve and open the upper one.
  - Briefly open the drain valve of the inspection glass.
  - Open the lower inspection glass valve.

Be aware of the risk of burns and noise when steam emerges.

Cleaning may also be required between the prescribed 3-month intervals, depending on operating conditions.

- Check that the pressure regulation of the steam generator takes place between the two limits indicated on the wiring diagram.
- Carry out a safety check on the boiling-dry protection of the steam generator.

- Using the operating switch, check that the safety contactors turn on and off.

To check the boiling-dry protection and pressure regulation, see "Steam generator settings and checks" in the chapter on ADVICE AND INSTRUCTIONS.

NAA015 . . . . . Quarterly inspection, steam converter

Use the ***Test pressure limiter*** key switch to raise the pressure in the steam generator (i.e. not under the control of the pressure regulator) when testing the operation and settings of the safety valves.

NOTE:

The key for this switch must be kept by the person responsible for operation of the plant.

See also under the "Steam generator settings and controls" heading in the GENERAL ADVICE chapter.

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

- Check operation of the steam generator safety valve as follows.
- Turn the "Test pressure limiter" key switch to the Test position (l) to apply maximum power to the steam generator (i.e. not controlled automatically by the control system). (The switch is fitted on the exterior of the electrical connection cubicle.) Watch the pressure rise on the steam supply pressure gauge. The safety valve should start to lift at 3.5 ± 0.14 bar. The pressure, when the valve is blowing fully, must never exceed 3.85 bar. Replace the safety valve if this condition is not fulfilled.

Turn the key switch immediately to the (0) position if the safety valve does not open or if the pressure tends to exceed 3.85 bar for any reason.

- Turn the key switch to the normal operating position (0) and remove the key.
- Check that the safety valve is not leaking any steam and that its lead seal is intact.

- Check the performance of the chamber safety valve as follows.
  - Start a process having a high sterilization temperature and wait for it to reach the sterilization phase. Turn the Test pressure limiter key switch to the Test position (l) during the sterilization phase to apply maximum power to the steam generator (i.e. not controlled automatically by the control system). Watch the pressure rise on the steam supply pressure gauge. Turn the switch to the normal operating position (o) at a pressure immediately below 3.5 bar.
  - Operate the pilot valve for the chamber steam valve manually and watch the pressure rise on the Chamber pressure pressure gauge. Acknowledge the temperature alarm if it operates. The safety valve should start to lift at 3.0 ± 0.14 bar. The pressure, when the valve is blowing fully, must never exceed 3.3 bar. ***Replace the safety valve if this condition is not fulfilled.***

Return the pilot valve immediately to the normal operating position if the safety valve does not open or if the pressure tends to exceed 3.3 bar for any reason.

  - Return the pilot valve to its normal operating position and terminate the process.
  - Check that the safety valve is not leaking any steam and that its lead seal is intact.
- Check that the steam generator pressure is regulated at the pressure set on the reducing valve.

See also under the “Steam generator settings and controls” heading in the GENERAL ADVICE chapter.

NAX067. . . . . Safety valve test B5A...LAB1

- Check correct performance of the chamber safety valve by turning the knurled cap on the safety valve anticlockwise when the chamber is at operating pressure. Turn the cap back to the closed position when the valve opens..

WARNING: The safety valve will be hot. Always wear protective gloves when performing this test.

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

NAA023 . . . . . Safety valve test, stand-alone steam generator

- Check the working of the chamber and jacket safety valves by twisting the knurled knob of the valve anticlockwise with operating pressure in the chamber or jacket. Twist back to the closed position when the valve is opened.

IMPORTANT: The safety valve is hot! Always wear protective gloves when carrying out this work!

Steam blowing out is always dangerous and can cause burns. The noise levels can cause damage to hearing.

NAX027 . . . . . GEE General

Every three months

- Check that all electric terminal and connection screws are tightened.
- Check that the door surface facing the chamber is free from scratches so that a reliable tightness is ensured.

NAX007 . . . . . General

Every three months

- Overhaul as stated under ”Monthly”.
- Check that the safety valve lead seal is intact.
- In case the seal isn't intact, the valve has to be replaced. Alternatively, call for an authorized person from the pressure-vessel authorities, who will check the valve and seal it.

If the seals is broken, the set-pressure of the valve might have been manipulated. Sterilizers with broken safety valve-seals are not to be used.

- Sterilizers with safety valves for compressed air or water are checked by turning the knurled cap of the safety valve while having pressure in the chamber.
- Check that the safety valve is not leaking steam, air or water.

NAX031 . . . . . Sterilizer with recorder

- Check the accuracy of the recorder.

NAX008. . . . . . Sterilizer with vacuumpump Not GEE

- Make a leak test using the appropriate program, as described in Chamber Leak Test in the OPERATOR MANUAL.
- Clean the restriction/throttle valves as described in *Vacuum pump, Anti cavitation air*.

NAV008. . . . . . GE66x

- Check that the RTD Pt 100 is located in the centre of the drain tube with the tip 70-75 mm below the chamber bottom.

NAX037. . . . . . Quarterly service. Hosp. div.

Every three months

Check the function of the safety valves with steam generator equipped sterilizers, according to the points 1-4:

- Set the key switch SK201 in test position (●) in order to connect maximum uncontrolled electric power to the heating elements. (This switch is located on the outside of the connection box. It becomes accessible after removal of the lower side trim plate).
- Monitor the pressure rise on the pressure gauge STEAM SUPPLY. The pressure limiter (if fitted) should cut out at 300kPa and steam blow off should begin at 350 ±14 kPa (set pressure). The relieving pressure (at maximum valve opening) should never exceed 385 kPa. *Replace safety valves not fulfilling these requirements*.

Reset immediately the key switch SK303, to normal position (o), if the safety valve does not open or if the pressure tends to rise above 385 kPa.

- Reset SK303 to working position (o) and remove the key.
- Check that the safety valve seal is intact.

NAA011. . . . . . New steam generator...de-ionised water…automatic blowdown

- Empty the steam generator when the steam supply pressure gauge shows 0.1-0.5 bar by opening the blowdown valve manually by means of its pilot valve, or from the operator's control panel. The steam generator must be completely emptied.
- Acknowledge the alarm and refill the steam generator after it has emptied.

See also under the “Care of the steam generator” heading in the GENERAL ADVICE chapter.

Blowing steam is always dangerous by means of burning. The noise during blowing can be dangerous for your hearing.

NAX068 . . . . . General, 2066

- Clean all filters, including the plastic strainers in the cooling water and float valve inlets.
- Clean all steam traps. Remove deposits on their seats and floats.
- Check that all pipe joints in ancillary services and the sterilizer are tight.
- Perform the various measures as listed under “Monthly”.

NAH009 . . . . . General sideways-opening, hospital, autoclaves >6912

- Clean all dirt filters including the plastic screen in the inlet of the float valve.
- Clean all steam traps. Remove coatings on the seat and ball of these.
- Check that the pipe system of the installation and autoclave is leak-tight.
- Carry out actions under the heading of "Every month".

NAX010 . . . . . General pharm. div

Every six month

- Overhaul as stated under ”Every three months”.
- During a process the temperature- and pressure sensors connected to the control system shall be checked against an independent system. The chamber is equipped with connections (VT & QT) for the independent sensors. The independent temperature sensors shall be positioned as close as possible to the temperature sensor to be checked. The temperature deviation may not be greater than 0,5 ^{o}C. For calibration of the sensors, See chapter CONTROL UNIT PACS 2000. The pressure deviation, at 1 bar(a), may not be greater than ±10 mbar. For pressure above 1 bar(a) the deviation may not be greater than 0.01 x P(abs). See chapter CONTROL UNIT PACS 2000.

Every six months

- Overhaul as stated under ”Every three months”.
- During a process the temperature- and pressure sensors connected to the control system shall be checked against an independent system. The chamber is equipped with connections (VT & QT) for the independent sensors. The independent temperature sensors shall be positioned as close as possible to the temperature sensor to be checked. The temperature deviation must not, during the latter part of the sterilization period when the sensors´ differing response time have settled, exceed 0,5°C. For calibration of the sensors, See chapter CONTROL UNIT PACS 2000
  The pressure deviation, at 1 bar(a), may not be greater than ±10 mbar. For pressure above 1 bar(a) the deviation may not be greater than 0.01 x P(abs). See chapter CONTROL UNIT PACS 2000.
  The differential pressure of the pressure sensors should preferably not exceed ±1.6 mbar at 70 mbar(a). At a pressure of 1 bar(a), the difference must not exceed ±10 mbar (or ±5 mbar for formalin sterilizers), while for pressures above 1 bar(a) the difference must not exceed 0.01 x P(abs). See chapter CONTROL UNIT PACS 2000 .

Note that it can be difficult to make a comparison between the sterilizer's pressure sensors and an independent pressure sensor at these low pressure differences. The inaccuracy of the independent pressure sensor, together with temperature drift and the calibration of both the instruments, can act together such that the lowest pressure differences are difficult to maintain

If the sterilizer pressure sensor is removed, the O-ring seal must be replaced by a genuine new Getinge replacement seal.

- Carry out the following measures following described under the heading Door:
  - Check the distance between door(s) and seal groove.
  - Check the position of the door and door lock as described in “Position of closed door” and “Indication of closed door”.
  - Make the check as described in “Blocking of door lock” during operation on sterilizers with door lock powered by electric motor or compressed air.
  - Make the safety check as described in “Blocking the admittance of chamber mediums”.
  - Make the safety check as described in “Blocking the door motion and the door seal mediums”.
  - Lubricate the door seal. Replace the seal if needed.
  - Check the tension of the “Door weight compensating spring”.

- Fibre tip pens should be checked and replaced if necessary.
- Check that the Pt100 temperature sensor is undamaged and that it is located in the centre of the drain tube, with its tip 76 (1 mm below the bottom of the chamber.
  If the basic setting has been altered at a validation, the basic setting takes precedence over the value specified above.
- On sterilizers that have a program for sterilizing liquids, carry out the safety check described in “Monitoring the temperature of the load when sterilizing liquids”.
- On laboratory sterilizers with jacket cooling, carry out the safety check described in “Supplementary instruction for laboratory units”.
- Clean the holes and nipples described under “Vacuum pump”, “Cavitation protection”. With the sterilizer in service, check that air is drawn into the pump.
- If the sterilizer is fitted with the ECO water-saving system, clean the throttling valves as described under “Supplementary instruction for ECO systems”.
- Lubricate the sliding bearings of the door lock, with teflon spray.

NOTE: Grease must not be used!

- Check the condition of the bolted connection of the door lock. Also check the door lock for wear.
- Print out the list of the last twenty faults (see CONTROL UNIT PACS 2000) and assess whether these indicate faulty components or incorrect settings.

- Check the operation of the display on the operator panel, the LEDs and printer (if any). See CONTROL UNIT PACS 2000.
- Carry out a leakage test on the sterilizer using the special leakage testing program described under “The process” in the FUNCTION DESCRIPTION. Sterilizers that do not have the leakage testing program must be tested as described under “Chamber leakage test”.

NAX070. . . . . Every six months (continued, 2066)

- Perform the following maintenance measures, described in more detail in the The Door chapter:
  - Check the door action.
  - Check the door position vertically, sideways and backwards and forward.
  - Check the performance of the door seal and the door seal groove valves.
  - Lubricate or replace the door seal if necessary.
  - Perform safety checks as described in “Door safety devices”.
  - Perform safety checks as described in “Interlocking the start function”.
  - Perform safety checks as described in “Preventing admission of chamber media supplies”.
  - Perform safety checks as described in “Safety interlocking of the door opening”.
- Test the recorder pens and/or ribbons, and replace if necessary.
- Check that the Pt100 temperature sensor(s) is/are undamaged. The sensor in the drain tube must be adjusted so that its tip is 90 mm beneath the bottom of the chamber.
- If the basic setting has been altered in connection with validation, the modified setting shall take preference over the value specified above.
- Clean the holes and nipples as described in “Vacuum pump” and “Cavitation protection” in the COMPONENTS chapter. With the sterilizer in operation, check that air is drawn into the pump.
- Perform a flow check, as described under the heading “Heat exchanger” in the COMPONENTS chapter, to check the capacity of the heat exchangers.
- Print out the list of the 20 most recent faults (see the CONTROL UNIT PACS 2000 chapter), and decide whether they indicate faulty components or faulty settings.
- Check the correct operation of all items on the operator's control panel, i.e. the display and LEDs and, where appropriate, of the printer. See the CONTROL UNIT PACS 2000 chapter.

NAX086 . . . . . Every six months cont. 2044

- Carry out the following items which are described in the chapter on DOOR.
  - Check the distance between door/doors and seal grooves.
  - Check the setting and indication of closed door.
  - Check the operation of the valves of the chamber and seal groove.
  - Lubricate or replace door seal where necessary
  - Safety checks as described in “Safety equipment of doors”.
  - Safety check on door catch during operation on sterilizers with electric or pneumatic door catch.
  - Safety checks as described in “Blocking of chamber media supply”.
  - Safety checks as described in “Safety blocking of door opening”.
- Check the spring tension on the door suspension system.
- Test the operation of recorder pens and/or ink ribbons. Replace if necessary.
- Check that the temperature sensor(s) Pt100 is/are undamaged. The sensor in the drain must be adjusted with the tip 73 mm below the bottom surface of the chamber.
  If the basic setting has been changed in a validation, the setting made must apply before the value stated above!
- Clean the holes and nipples as described in “Vacuum pump”, “Cavitation protection” in the chapter on COMPONENTS. Check during operation that air is drawn into the pump.
- Perform a flow check to check the capacity of the heat exchangers. See “Heat exchangers” in the chapter on COMPONENTS.
- Print out a list of the twenty last faults (see chapter on CONTROL UNIT PACS 2000) and assess whether these indicate faults in components or settings.
- Perform a check on the operation of the operator display, LEDs and where appropriate printer. See chapter on CONTROL UNIT PACS 2000.
- Lubricate plain bearings on the door catch with teflon spray.

IMPORTANT! Grease must not be used under any circumstances!

- Check the condition of the door catch with respect to screwed joints and wear.

NAM008 . . . . . Every 6 months cont. GEF-449

- Carry out the following items which are described in the chapter headed THE DOOR:
  - Checking of distance between door(s) and seal groove.
  - Checking of setting and indication of closed door.
  - Checking of operation of valves of chamber and seal groove.
  - Any lubrication or replacement of door seal.
  - Safety checks according to "Safety equipment of the doors".
  - Safety check on door catch during operation on sterilizers with electric or pneumatic door catch.
  - Safety checks according to "Blocking of media supply to chamber".
  - afety checks according to "Safety blocking of door opening".
- Check spring tension on door suspension system.
- Test function of recorder pens and/or ink ribbons. Replace if necessary.
- Check that the temperature sensor(s) Pt100 is/are undamaged. The sensor in the discharge must be adjusted with the tip 102 mm below the bottom surface of the chamber.
  If the basic setting has been amended in a validation, the setting made must apply before the value indicated above!
- Clean the holes and nipples described in "Vacuum pump", "Cavitation protection" in the chapter on COMPONENTS. Check that air is drawn into the pump during operation.
- Print out the list of the twenty most recent faults (see chapter on CONTROL UNIT PACS 2000) and assess whether these indicate faults in components or settings.
- Carry out a functional check on the operator panel display, LEDs and where appropriate printer. See chapter on CONTROL UNIT PACS 2000.
- Lubricate slide bearings on the door catch with teflon spray.

NOTE: Grease must not be used under any circumstances

- Check the condition of the door catch with respect to screw joints and wear.

NAX071. . . . . Supervision of load temperature, liquid sterilizers

- Perform the safety checks as described in “Supervision of the load temperature for liquid sterilization” and “Safety interlocking of the

door with liquid sterilization", as described in the GENERAL ADVICE chapter.

NAX072 . . . . . ECO system: checking the sealing water system

- Clean the flow restricters and adjust the flow of vacuum pump sealing water if necessary, as described under "Maintenance" in the "ECO water saving system" section.

NAX073 . . . . . ST system: checking the sealing water

- Check and, if necessary, adjust the vacuum pump as described in the "Sealing water" section in the COMPONENTS chapter.

NAA019 . . . . . Tightness checks, new steam generator

- Check the tightness of:
  - the heater
  - the level control electrodes
  - the overheating protection device sheath.
- Check that the terminal connection screws on the heating elements are tight.

NAA016 . . . . . Check steam converters for leaks

- Check for leaks at:
  - the pipe coil
  - the fixing of the level switch

NAV009 . . . . . Sterilizer with automatic, vertically operating door

- Carry out the following measures following description under the heading *Door*:
  - Make the check as described in *Adjusting the door motion*.
  - Make the safety check as described in *Door safety arrangements*
  - Make the safety check as described in *Blocking the start and opening the door*.
  - Make the safety check as described in Blocking the admittance of mediums to the chamber.
  - Make the safety check as described in *Safety check, chamber pressure switch.*
  - Make the check as described in Emergency stop button.

NAH002 . . . . . Sterilizer with automatic, horizontally operating door Not GEE

- Check that the following door components are firmly fixed:
  - Electric limit switch
  - Door lock and pneumatic limit switch
  - Door motor
- Check that the timing belt is free from cracks and replace if necessary
- Lubricate the door seal. Replace the seal if needed.

NAX035. . . . . GEV flow through fan shaft seal

- Check that, during a cycle, condensate drops into the overflow cups on the fan shaft seal. The rate should be a minimum of 5 drops per second (200 ml/m).

NAX011. . . . . Big??? sterilizer with air-in filter

- Replace the air filter. The filter should be changed more frequently if the air contains high amount of particles or humidity,

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NAX028. . . . . GEE General

Once a year

- Overhaul as stated under ”Every three months”.
- Replace the air in filter. Check it for a rigid and tight fit. Replacement intervals should be adapted to the cleanness of the air where the sterilizer is installed.
- Clean all strainers. Do not forget the liquid gas nozzle filter on the gas evaporator.
- Check and adjust the amount of sealing water (and anti cavitation air when not automatically dosed) for the vacuum pump in accordance with instructions under the headline ”Vacuum pump” in this manual.
- Flush the gas pipes with water supplied at the upper valve ”I” (*see piping diagram*) which should be opened simultaneously with the lower valve ”I”. Collect the water in the glycol container of the recirculation water tank.
- Check for leaks on pipe joints, valves and fittings while the cover plates are removed.
- Run all processes and check pressure temperature, times and pilot lamp functions. Save all recorder diagrams from tests made.
- Put a test pressure of 8 - 10 bar on the pipe connecting the gas bottle and the sterilizer and check for leaks. Blow through afterwards with nitrogen.

NAX089 . . . . . Moisture meter. Change the wick

- Change to a new wick (part No. 570 06 37-01) on the wet temperature sensor belonging to the moisture meter.

NAX012 . . . . . General Not GEE

Once a year

- Overhaul as stated under ”Every six months”.
- Make the check as described in *Checking and adjusting the door position.*
- Make the safety check as described in *Safety check, chamber pressure switch.*
- Make the safety check as described in *Safety check, door seal groove pressure switch.*
- Check for leaks on pipe joints and fittings.
- Check that all electric connection screws are tightened.
- Clean all filters and strainers
- Clean all steam traps.

NAH004 . . . . . Sterilizer with horizontally operated doors

- Carry out the following measures following description under the heading *Door*:
  - Make the safety check as described in *Safety check, door lock and pneumatic limit switch*
  - Make the safety check as described in *Safety check, electric limit switch.*
  - Make the safety check as described in *Emergency stop button*

NAX020 . . . . . Small??? sterilizer with air-in filter

- Replace the air filter. The filter should be changed more frequently if the air contains high amount of particles or humidity,

NAX013 . . . . . Sterilizer with vacuumpump

- Check and adjust the amount of sealing water and anti cavitation air for the vacuum pump in accordance with instructions given under headline *Vacuum pump.*
- Check and adjust the water level of the feed water tank to about 13 mm (1/2”) below the overflow.
- Check that the feed water enters at least 20 mm above the overflow level.

NAX030. . . . . . General

- Run all processes and check pressure, temperature, times and pilot lamp functions. Save all recorder diagrams from tests made.

NAX039. . . . . . Every / every second year. Hosp. div.

Each a year

- Carry out the inspection described under “Every six months”.
- Check and adjust the amount of sealing water to the vacuum pump in accordance with the instructions given under “ECO system” or, if that system is not fitted, under “Vacuum pump”.
- Check and adjust the water level of the feed water tank to about 12 mm (1/2”) below the overflow.
- Check that the feed water enters at least 20 mm above the overflow level.
- With the trim plates removed, check for leaks at pipe couplings and instrument connections. Repair if necessary.
- Check that all electric connection screws are tightened.
- Clean all dirt filters.
- Clean all steam traps.
- Run all processes and check pressure, temperature, times and pilot lamp functions. Save all recorder diagrams from tests made.

Every second year

- If the water is harder than 4dH, clean all plate-type heat exchangers. See “Heat exchangers” under “COMPONENTS”.
- Replace the magnetic core and springs of solenoid valves that work with steam.

NAX074. . . . . . Each year, 2066. Hospital division

Each year

- Perform the maintenance operations as described under “Every month” up to and including “Every six months”.
- Check and, if necessary, adjust the water level in the feed water tank so that it is about 12 mm below the overflow outlet.
- Check that the feed water inlet pipe discharges at least 20 mm above the overflow outlet.

- Check that all electrical connection screws are tightened.
- Run all processes and check pressure, temperature, times and operation of the indicating lamps for all of them. File the printer charts resulting from these test runs.

NAX088 . . . . . Servicing of GE-lab fan (before NAX075)

- Replace the bearing on the fan inside the chamber. See “Magnetic driven fan” in the section on “Components”

NAX075 . . . . . Every year, formalin sterilizers

- Neutralise any formalin residues in inaccessible parts of the piping system by running a formalin process, but replacing the formalin solution with a corresponding quantity of 5% ethanoic acid solution.

NAA020 . . . . . Each year, new steam generator

- Perform the following pints as described under the 'Care of the steam generator' and 'Steam generator settings and controls' headings in the GENERAL ADVICE chapter.
  - Inspect the steam generator for sludge build-up and/or lime by removing the level control device and the lower heating element, and clean it if necessary.
  - Perform a safety test of the steam generator overheating protection device.
  - Perform a safety test of the steam generator's feed water supply system and controls.
  - Perform a safety test of the steam generator overfilling protection device.

Note that the steam generator must be inspected each year by an accredited inspection body.

NAA017 . . . . . Yearly, steam converter

- Perform the following pints as described under the 'Care of the steam generator' and 'Steam generator settings and controls' headings in the GENERAL ADVICE chapter.
  - Check and if necessary clean the steam converter to remove sediments and limescale, by removing the level device and the lower blanking plate.
  - Remove the pipe coil and clean it and the level device.
  - Perform a safety test of the steam generator's feed water supply system and controls.

Note that the steam generator must be inspected each year by an accredited inspection body.

NAX076. . . . . 2066...Every second year

Additional maintenance operations, every second year

- Perform the following points, as described in the “Heat exchangers” section of the COMPONENTS chapter.
  - Clean all the plate heat exchangers if the hardness of the water exceeds 4 °dH.
  - Pressure-test all the heat exchangers.

NAA013. . . . . The new steam generator. Every fourth year

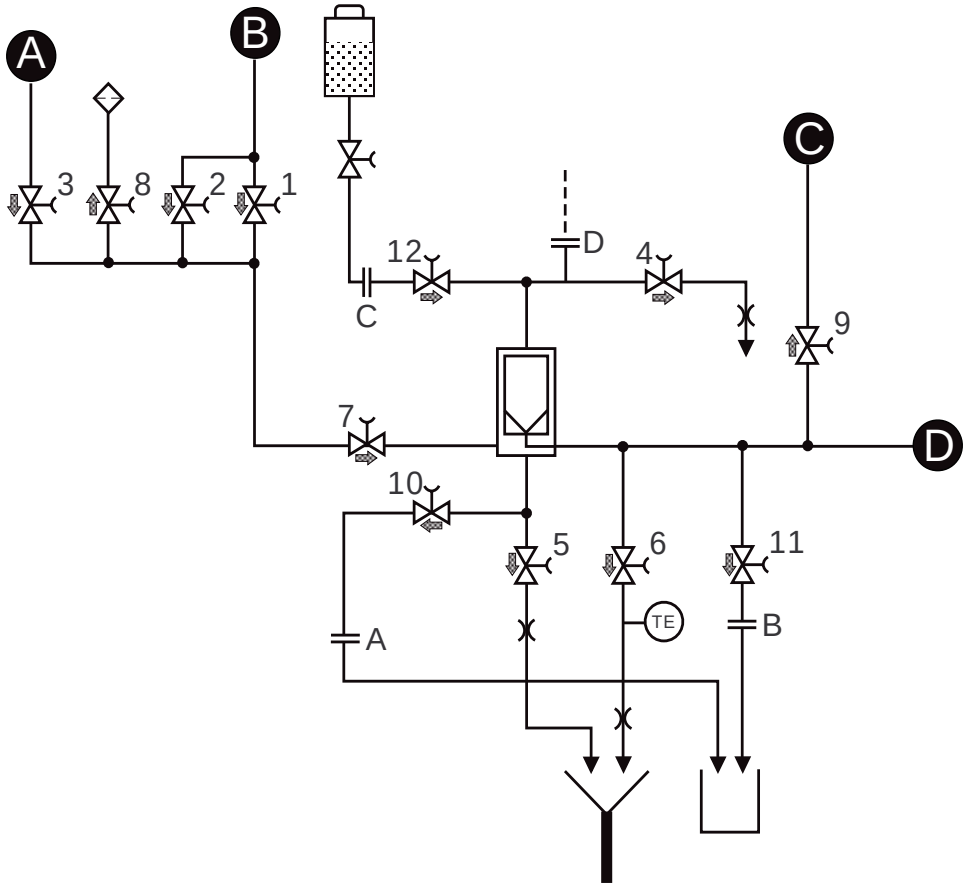
Additional maintenance operations, every fourth year

- Replace the contactors of a steam generator that is in continuous use every fourth year, provided that the instructions for setting the pressure switch have been followed. If closer pressure limits have been employed, it may be necessary to replace the contactors at shorter intervals.
- Replace the pressure switch used for controlling the steam generator pressure.

NAX024 . . . . . Manual filter sterilization

Air filter sterilization and testing

The sterilizer is equipped with a system for manual in-line sterilization and wetting of the air filter. A separate ”filter integrity test unit” i required for the integrity test.



Sterilization

1. Close valve No. 1 (compressed air supply) and make sure that valve No. 7 is open.
2. Close valve No. 9 (door seal medium).
3. Open valve No. 6 and relive pressure.
4. Open valve No. 3 (steam) one turn.
5. Open valve No. 4 (airing) fully.
6. Open valve No. 5 (condensate drain).
7. Close valve No. 4 (airing) after 1-2 minutes when only steam is discharged.
8. Adjust the pressure to 1 bar by opening valve No. 3 (steam).
9. Start counting the sterilization time when the thermometer indicates 121^{o}C. Make required adjustments to maintain this temperature during the sterilization period.

10. When the 20 minutes sterilizing time has expired, close valve No. 3 (steam) slowly and open simultaneously valve No. 2 (cooling air) one turn.
11. When the temperature has fallen to 100°C due to the cooling air flow, open valve No. 2 (cooling air) to make the pressure rise to 3 bar.
    Open the valve fully when the temperature has fallen to 60°C.
    To speed up the cooling, valve No. 4 (airing) can be partly opened.
12. A satisfactory temperature is obtained when the temperature has fallen to 30°C.
    Close valve No. 4 (airing), No. 5 (condensate discharge) and No. 6 (bleeding steam).
13. Open valve No. 1 (compressed air supply). Skip this point if the filter is to be integrity tested.
14. Close valve No. 2 (cooling air).
15. Open valve No. 9 (door seal medium).

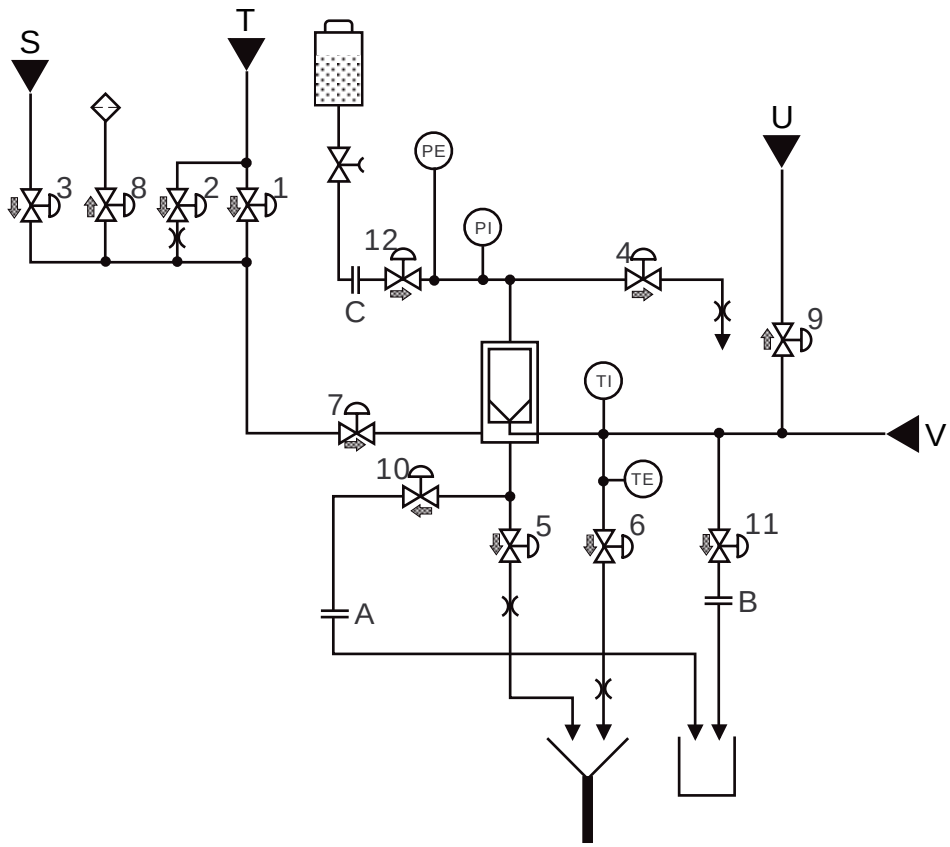
Wetting and integrity testing

1. Perform a filter sterilization, as described earlier. However, skip point No 1 (Don't open valve No 1 / compressed air supply)
2. Wet the filter:
   a) Check that both valves 1 and 7 are closed.
   b) Open valve 6 to relive any pressure in the filter holder. Then close the valve.
   c) Connect the collecting vessel to connections A & B.
   d) Connect the vessel, with wetting liquid, to connection C.
   e) Open valve 12.
   f) When the filter holder is filled with wetting liquid wait 15 minutes then open valve 11, to achieve a small flow of liquid through the filter cartridge.
   g) The wetting period is to continue for 10 minutes. Then open valve 10 fully and drain the liquid to the collecting vessel.
   h) Close valves 10 and 12.
   i) Wetting procedure is finished.
3. Test of filter:
   a) Connect the test equipment (Palltronic or similar) to connection D.
   b) Open valve 8 and valve 11.
   c) Make the test as per instructions for the test equipment.
   d) Close valve 8.
   e) Open valve 1 and 7.
   f) Keep valve 6 open for about 1 minute, to blow out residuals of wetting liquids.

Air filter sterilization and testing program.

The sterilizer is equipped with a program for automatic in-line sterilization and integrity testing of the air filter. The program includes 3 major stages:

1. Sterilization.
2. Wetting.
3. Testing.



S = steam	T = compr. air	U = compr.air for doorseal	V = compr. air for chamber

Note: Before starting the test program, make sure that the container for wetting liquid contains enough wetting liquid. Also check that the hoses for the wetting liquid container and the collecting vessel is firmly connected.

The type of wetting liquid to be used, is described in the documentation from the filter supplier.

Sterilization

1. Valve 1 & 9 will close, and valve 6 open. The filter housing will be depressurized.
2. Valve 4 & 5 opens. The sterilization temperature is controlled by valve 3. Valve for compressed air to chamber opens.
3. The system is kept like this for a period of time, to make sure that air is removed.
4. After the air is removed, valve 4 and valve for compressed air to chamber will close.
5. By operating valve 3, the system will be sterilized at 121 ^{o}C for 20 minutes.
6. After sterilization the system will be cooled down. This is done by opening valve 2 and letting the air cool the filter.
7. When the filter temperature is down to 30 ^{o}C, the cooling is ended. Valve 2, 5 & 6 will close and valve 1 will open.

Wetting of filter

1. Valve 1 closes an valve 6 opens. The filter housing will be depressurized.
2. Valves 6 & 7 closes. By opening valve 12, the wetting liquid is allowed into the filter housing. The system is left in this position for about 15 minutes, in order to fill the filter housing with wetting liquid.
3. Valve 11 opens and a limited flow of liquid will flow through the filter cartridge. Liquid is allowed to flow through the cartridge for about 10 minutes.
4. After this wetting period valve 10 is opened, and the wetting liquid is drained to the collecting vessel.

Testing:

The type of test method used is a ”pressure decay test”. Values for this test is found in the documentation from the filter supplier.

For further information regarding the type of test, please contact the filter supplier.

1. Valves 6 & 7 opens. Valves 10, 11 & 12 closes. The test pressure is reached by regulating valve 2. In case the test pressure is not reached within 10 minutes, there will be an alarm. In case the pressure becomes too high, valve 5 will open until a pressure below

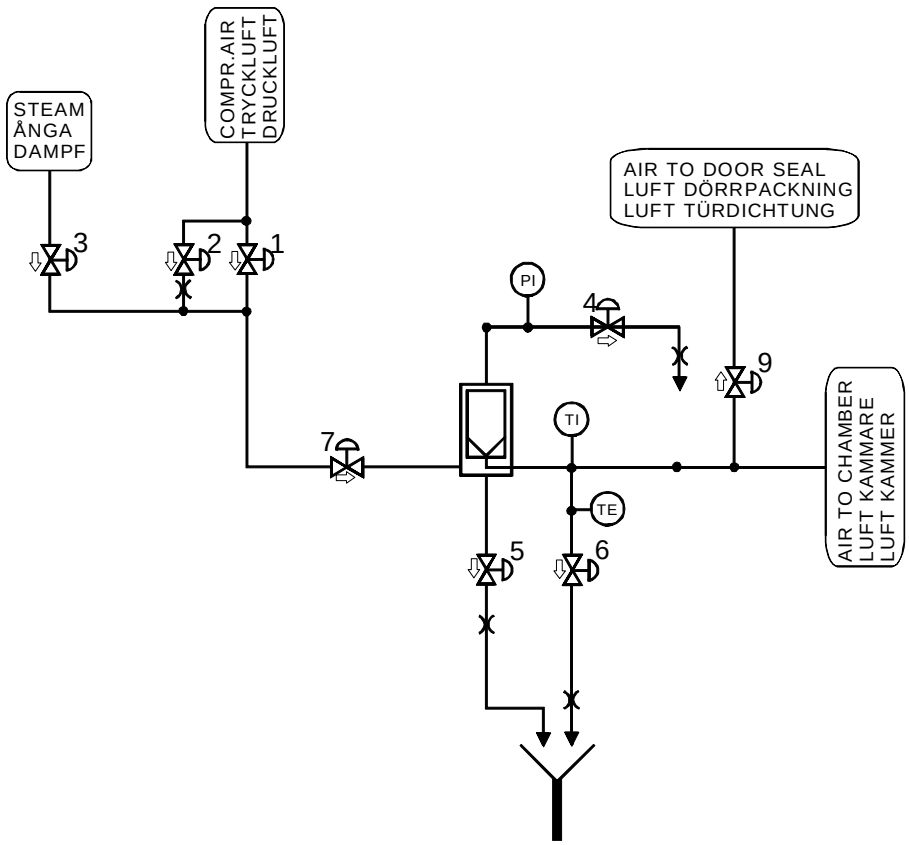
”test pressure +20 mbar” is reached. The system regulates the pressure for a period of time, until the system is stable.

2. Valve 7 closes and valve 8 opens. Now a second stabilization takes place.
3. After the stabilization time, the start pressure for the test is stored.
4. The test period is 10 minutes. In case the pressure drop is too high there will be an alarm.

NAX052 . . . . . Automatic filter sterilization.

Air filter sterilization program.

The sterilizer is equipped with a program for automatic in-line sterilization of the air filter.



1. Valve 1 & 9 will close, and valve 6 open. The filter housing will be depressurized.
2. Valve 4 & 5 opens. The sterilization temperature is controlled by valve 3.

3. The system is kept like this for a period of time, to make sure that air is removed.
4. After the air is removed, valve 4 will close.
5. By operating valve 3, the system will be sterilized at 121 ^{o}C for 20 minutes.
6. After sterilization the system will be cooled down. This is done by opening valve 2 and letting the air cool the filter.
7. When the filter temperature is down to 60 ^{o}C, the cooling is ended. Valve 2, 5 & 6 will close and valve 1 will open.

NAX051. . . . . Automatic filter sterilization and testing, divided.

Air filter sterilization and testing program.

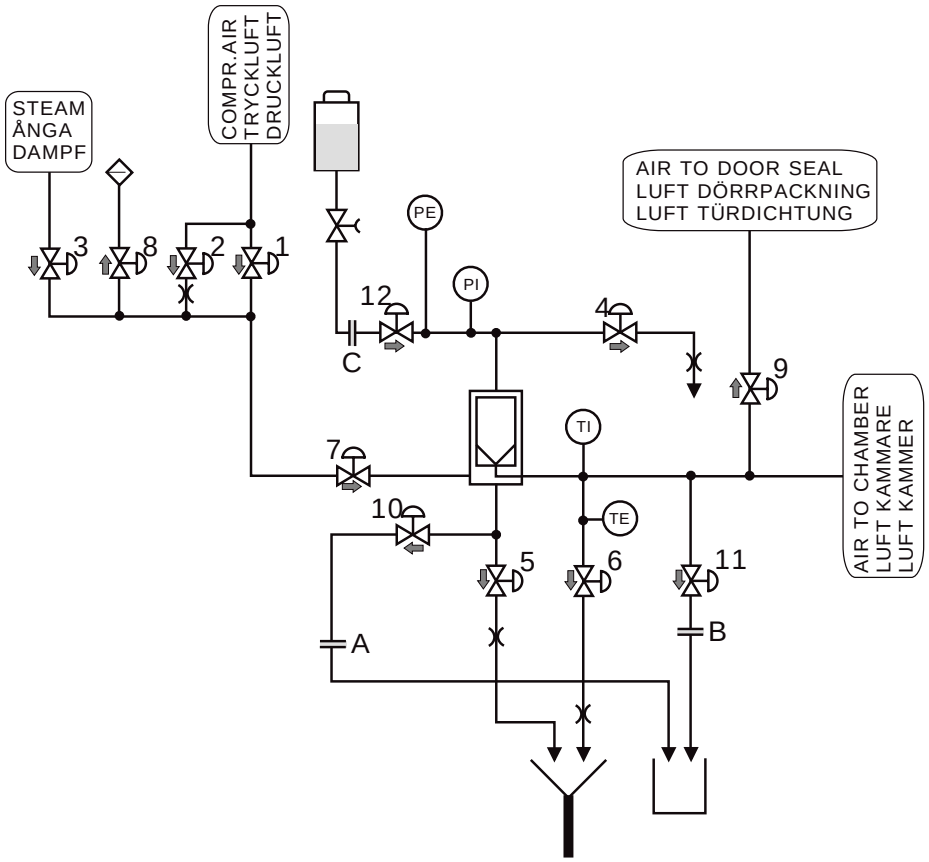
The sterilizer is equipped with separate programs for automatic in-line sterilization and integrity testing of the air filter.

The sterilization program includes 2 major stages:

1. Sterilization.
2. Cooling.

The integrity testing program includes 3 major stages:

1. Cooling.
2. Wetting.
3. Testing.



As the test is to be made at a temperature below 30°C, it is for some installations recommended to run the sterilization in the evening and the test in the morning the following day.

Sterilization

1. Valve 1 & 9 will close, and valve 6 open. The filter housing will be depressurized.
2. Valve 4 & 5 opens. The sterilization temperature is controlled by valve 3.
3. The system is kept like this for a period of time, to make sure that air is removed.
4. After the air is removed, valve 4 will close.
5. By operating valve 3, the system will be sterilized at 121 ^{o}C for 20 minutes.
6. After sterilization the system will be cooled down. This is done by opening valve 2 and letting the air cool the filter.
7. When the filter temperature is down to 60^{o}C, the cooling is ended. Valve 2, 5 & 6 will close and valve 1 will open.

Testing of filter

The type of test method used is a ”pressure decay test”. Values for this test is found in the documentation from the filter supplier.

For further information regarding the type of test, please contact the filter supplier.

Note: Before starting the test program, make sure that the container for wetting liquid contains enough wetting liquid. Also check that the hoses for the wetting liquid container and the collecting vessel is firmly connected.

The type of wetting liquid to be used, is described in the documentation from the filter supplier.

1. Valve 1 closes and valve 2, 5 & 6 opens.
2. When the filter temperature is down to 30°C the cooling is ended. Valve 2, 5 & 6 will close.
3. Valve 6 opens. The filter housing will be depressurized.
4. Valves 6 & 7 closes. By opening valve 12, the wetting liquid is allowed into the filter housing. The system is left in this position for about 15 minutes, in order to fill the filter housing with wetting liquid.
5. Valve 11 opens and a limited flow of liquid will flow through the filter cartridge. Liquid is allowed to flow through the cartridge for about 10 minutes.
6. After this wetting period valve 10 is opened, and the wetting liquid is drained to the collecting vessel.
7. Valves 6 & 7 opens. Valves 10, 11 & 12 closes. The test pressure is reached by regulating valve 2. In case the test pressure is not reached within 10 minutes, there will be an alarm. In case the pressure becomes too high, valve 5 will open until a pressure below ”test pressure +20 mbar” is reached. The system regulates the pressure for a period of time, until the system is stable.
8. Valve 7 closes and valve 8 opens. Now a second stabilization takes place.
9. After the stabilization time, the start pressure for the test is stored.
10. The test period is 10 minutes. In case the pressure drop is too high there will be an alarm.

PALL

Pall Europe Corporate Services
A division of Pall Europe Limited

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24 October 1995

Our Ref : CEP/cmc/let95-25.let

Getinge AB
Box 69
5-31 044 Getinge
Sweden

Dear Sirs,

As requested I have supplied the integrity test parameters for PALL microbially rated filters when wet with standard test fluids.

The integrity test values apply to ambient temperature (25°C ± 10°C) with compressed nitrogen as the pressure source. During the test period the temperature of the filter assembly should not vary more than ± 1°C.

Calculation of pressure decay values depends up on the upstream volume of the test system. The pressure decay value below assumes that the isolating valve in the process line is immediately upstream of the filter housing and that a system pressure transducer is used to measure pressure decay. No account has been taken of any other additional volume due to upstream pipework etc.

Forward Flow Test Parameters

Filter	Test Fluid	Housing	Test Pressure (mbar gauge)	Max Acceptable Flow (ml/min)	Pressure Decay (mbar in 10 min)
AB05V0022PV*	60/40 IPA/Water	ECS3000G18*	830	4.2	24

* Letters and Numbers in this position indicate o-ring material. H4 is silicone, J is EPR.

Yours faithfully

PP CE Powles
Senior Technical Support Engineer
SCIENTIFIC AND LABORATORY SERVICES

****IMPORTANT****

Because of developments in technology these data and procedures may be subject to change. Consequently, we advise users to review their continuing validity with Pall Europe Limited (PEL) annually.

Information herein is confidential to Pall Europe Limited. It must not be copied or disclosed in whole or in part to any person or persons other than to those to whom this communication is addressed.

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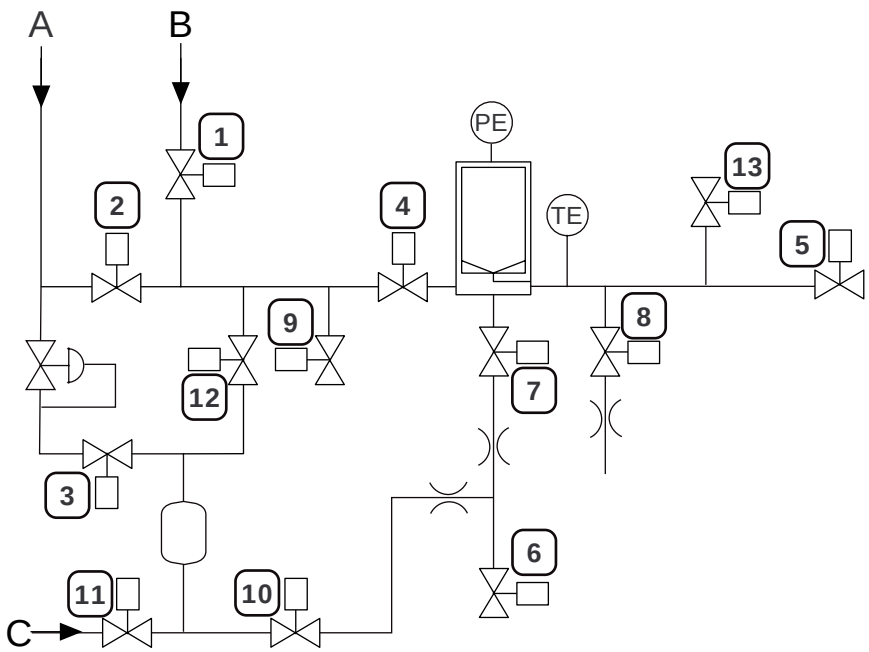
Automatic filter sterilization with integrity test

This sterilization and testing method was developed jointly with Sartorius, Germany.

The sterilizer has a program for sterilizing and testing air filters.
The program has the following stages:

- Sterilization
- Cooling
- Filling with water
- Test (Water intrusion test, WIT)
- Draining
- Drying



A= Compressed air	B= Steam	C= Water

When the filter is in normal use, valves 2, 4 and 13 are always open.

NOTE: The temperature in the service room and of the water used for the test should be between 20 °C and 30 °C for a reliable test.

Sterilization

1. Release all pressure from the filter housing and the water tank by closing valves 2 and 13 and opening valves 6, 7 and 12.
2. Then fill the water tank: open valve 11 and close valve 12.
3. Warm up the filter housing and cartridge with steam from valve 1. The steam valve is controlled by the temperature sensor downstream of the filter. Valves 6, 7 and 8 are open all the time during sterilization. Valve 5 is open until the temperature goes above 98 ^{o}C, after which the valve remains open for a further 30 seconds. This is done to drive air out of the system and to ensure sterilization of the pipe between the filter housing and the sterilizer chamber.
4. The filter is sterilized at 121 ^{o}C for 30 minutes. The system regulates on 122 ^{o}C. The sterilizing time clock is stopped temporarily if the temperature falls below 121 ^{o}C. Every five minutes, valve 5 opens for a few seconds to blow off any gases that do not condense.

Cooling

1. The filter is first cooled carefully with the aid of reduced compressed air from valves 3 and 12. The air is blown off via valve 8.
2. When the temperature has fallen to 80 ^{o}C, the air flow is increased by opening valves 5, 6 and 7.
3. Valves 6 and 7 are closed again when the temperature has fallen below 50^{o}C.
4. When the temperature is below 30 ^{o}C, cooling continues for a further 20 minutes.
5. Valves 4, 5 and 12 are closed and valves 8 and 9 are opened to release the pressure in the filter housing.

Filling with water

1. The water tank is pressurised with air from valve 3. The water is forced into the filter housing through valves 10 & 7. As long as the filter cartridge is not covered with water, the displaced air is forced through the filter cartridge and out via valve 8.
2. When the water level in the filter housing rises above the filter cartridge, the remaining air is compressed. When the pressure in the housing exceeds 1.3 bar(a), valve 8 closes.
3. The water pressure compresses the air in the filter housing to 3.5 bar(a). If the pressure has not reached 3.4 bar(a) within five minutes, it is assumed that the filter is leaking and the system gives an alarm.

4. The pressure in the filter housing is held at 3.5 bar(a) for a stabilizing period of 10 minutes. If more than 10 water pulses are needed to maintain the pressure during the stabilizing period, this indicates excessive leakage and the system give an alarm.
5. Valves 7 and 10 are closed. Valves 6 and 9 are opened to ensure that a leaking valve does not raise the pressure in the filter housing. There is a further stabilizing period of one minute before the leakage test begins. If the pressure falls below 3.4 bar(a) during this time, an alarm is given.

Testing

1. The test begins when the pressure has fallen below 3510 mbar.
2. The test period is 10 minutes. The permitted pressure drop depends on the volume of air in the filter housing. This air volume has been measured by Getinge AB before delivery and the permitted pressure drop has been calculated. See separate report. The permitted pressure drop has been programmed into the control system.
3. If the pressure drop gets too great, an alarm is given and the program stops and waits for a signal from the operator. The operator can then proceed with draining/drying, by pressing “Start/Restart” or repeat the test by pressing “P1/Test”. If the test is repeated, the program returns to the water filling stabilizing period and starts the process from that point.

Draining

1. Reduced compressed air comes in through valves 3 and 12. Valve 9 closes and valve 4 opens. The water in the filter housing is released via valves 6 & 7. This takes three minutes.
2. Valves 3, 4 and 5 close. The system waits for five seconds to be sure that valve 4 has closed.

Drying

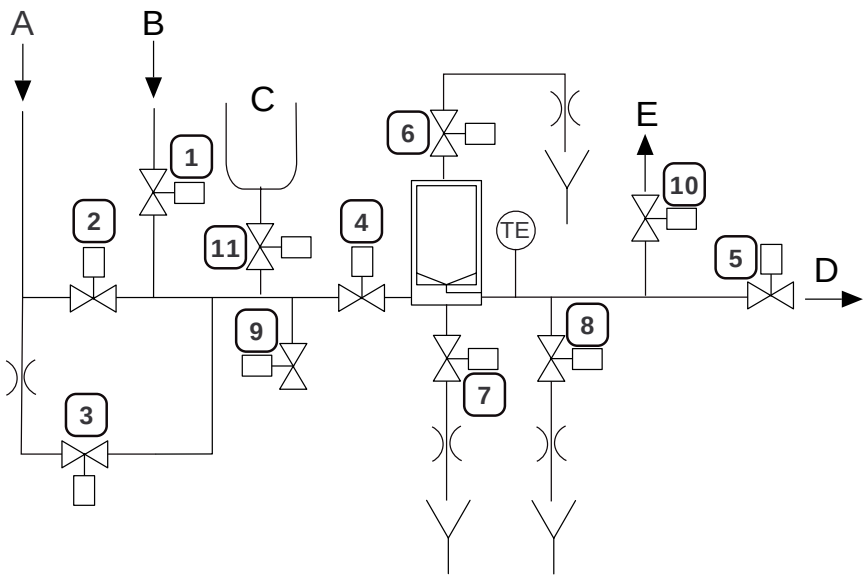
1. Air blows through the filter housing because valves 2, 4, 6, 7 and 8 open. Valve 10 opens, draining the water tank. Drying continues for 15 minutes.
2. All valves close. Valves 2, 4 and 13 open.
3. The test is complete.

Automatic filter sterilization with manual integrity test

This sterilization method was developed jointly with Sartorius, Germany.

The sterilizer has a program for sterilizing and testing air filters. The program has the following stages:

- Sterilization
- Cooling
- Filling with water
- The test is done by the operator with special equipment
- Draining
- Drying



A= Compressed air	B= Steam	C= Water
D = To Chamber	E = To door seal	

When the filter is in normal use, valves 2, 4 and 10 are always open.

NOTE: The temperature in the service room and of the water used for the test should be between 20 °C and 30 °C for a reliable test.

Sterilization

1. Fill the water tank before starting the sterilization cycle.
2. Release all pressure from the filter housing by closing valves 2 and 10 and opening valves 6, 7 and 8.
3. Warm up the filter housing and cartridge with steam from valve 1. The steam valve is controlled by the temperature sensor downstream of the filter. Valves 7 and 8 are open all the time during sterilization. Valve 5 is open until the temperature goes above 98 ^{o}C, after which the valve remains open for a further 30 seconds. This is done to drive air out of the system and to ensure sterilization of the pipe between the filter housing and the sterilizer chamber.
4. The filter is sterilized at 121 ^{o}C for 30 minutes. The system regulates on 122 ^{o}C. The sterilizing time clock is stopped temporarily if the temperature falls below 121 ^{o}C. Every five minutes, valve 5 opens for a few seconds to blow off any gases that do not condense.

Cooling

1. The filter is first cooled carefully with the aid of reduced compressed air from valve 3. The air is blown off via valve 8.
2. When the temperature has fallen to 80 ^{o}C, the air flow is increased by opening valves 5, 6 and 7.
3. Valve 7 are closed again when the temperature has fallen below 50^{o}C.
4. When the temperature is below 30 ^{o}C, cooling continues for a further 20 minutes.
5. Valves 3 and 5 are closed and valves 8 and 9 are opened to release the pressure in the filter housing.

Filling with water

1. The water tank is drained with valve 11. The water runs into the filter housing via valve 4. The displaced air passes through the filter cartridge and out through valve 6.
2. When the water level is the same as the level in the upper part of the filter housing, the filter housing volume upstream of the filter cartridge is full of water.
3. Valves 6 and 11 close and the control system display reads “Filter test”.

Test

The operator fits the test equipment and performs the test.
When the check is complete, the test equipment is removed and the operator presses the start button to let the program continue running.

Draining

1. Reduced compressed air comes in through valve 3. Valve 9 closes and valve 4 opens. The water in the filter housing is released via valve 7. This takes three minutes.
2. Valves 3 and 4 close. The system waits for five seconds to be sure that valve 4 has closed.

Drying

1. Air blows through the filter housing because valves 2, 4, 7 and 8 open.
   Drying continues for 15 minutes.
2. All valves close. Valves 2, 4 and 10 open.
3. The program is complete.

NAX040 . . . . . Service indicator. Hosp. div

Service indicator

The sterilizer has a system that monitors the service intervals listed above. The “alarm points” of the program are based on the sterilizer being used (i.e. connected) five days a week and eight hours a day.

If the actual connection time differs significantly from this, the service intervals should be reprogrammed. See the description of menu 6000 under “CONTROL UNIT PACS 2000”.

User-defined messages that appear after a set operating time or a set number of processes can be programmed.

Reading

When the sterilizer needs servicing, the message “MAINTENANCE” blinks on the display. The various service codes, their intervals in operating hours or processes and their status can be read in menu 6100 (see “CONTROL UNIT PACS 2000”).

The codes are presented in such a way that the most common action (the action with the shortest interval) appears first. The arrow keys can be used to browse through the menu images. Always check all pro-

grammed service codes, since a triggered weekly or monthly service may be “hidden” behind a triggered quarterly, six-monthly or yearly service.

Resetting

When the relevant service has been carried out in accordance with the instructions in this chapter, triggered service messages must be reset. See CONTROL UNIT PACS 2000.

NAX077. . . . . . Service indicator - FPC, OPC, OPH. Hospital division.

Service indicator

The sterilizer incorporates a system that monitors the service intervals listed above. The program's “alarm points” are based on the assumption that the sterilizer is used (= is connected) for five days a week and eight hours a day.

If the actual connection time differs significantly from this, the service intervals should be reprogrammed. See the “Menu descriptions” section and the “Service” menu in the CONTROL UNIT PACS 2000 chapter. User-defined messages that appear after a particular operating time, or after a set number of processes, can be programmed.

Reading

When the sterilizer needs servicing, the message “MAINTENANCE” appears on the display. The various service codes, their intervals in operating hours or number of processes, together with their status, can be read off from the “Service” menu, described above.

Always check all the programmed service codes as, in addition to a requirement for a particular weekly or monthly service, there may also be a requirement for a quarterly, six-monthly or annual service.

Resetting

When the particular service has been performed in accordance with the instructions in this chapter, the service message must be reset in the service menu.

NAX041. . . . . . ECO-Water saving system. Hosp. div.

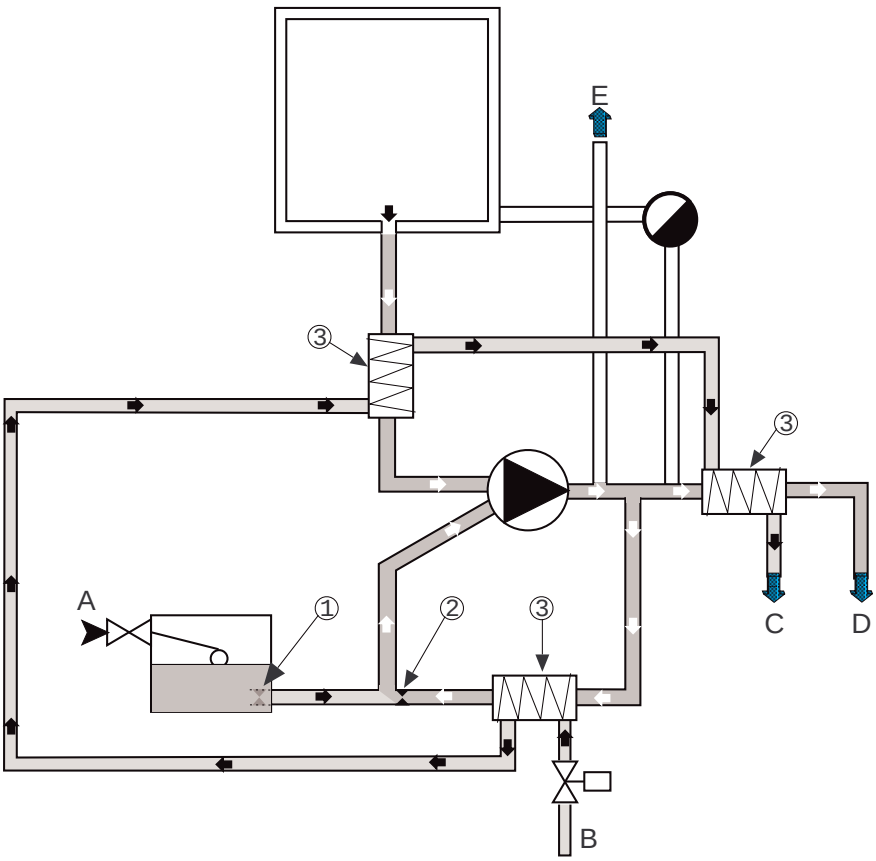
The ECO water-saving system

Pat. pend. PCT/SE94/00998

The sterilizer is fitted with the ECO (economy-ecology) water-saving system. This means that the water systems of the sterilizer are divided up into two separate pipe networks. One system contains water that come into directly or indirect contact with the materials, and has therefore been contaminated. The other system contains water that has been used for cooling in such a way that it is not contaminated and can therefore be used as process water.

The contaminated water is used mainly as sealing water for the vacuum pump, and is circulated in a system where it is cooled and diluted with about one-sixth fresh water from a water tank with an air break to increase the capacity of the pump.

The ECO system reduces water demand by about 40% if the clean process water is not re-used and by about 75% if it is re-used.



A Cold water

B Clean process water inlet

C Clean process water drain

D Contaminated process water drain

E Ventilation

1 Fixed throttle 0.6 to 0.8 litres / min.

2 Ball valve 3.0 to 4.0 litres / min.

3 Plate-type heat exchanger

Maintenance

Where the water is harder than 4 dH, fixed throttle 1 and ball valve 2 must be cleaned at least every six months. Note or preferably mark the setting of the ball valve before it is removed. Take care to set the opening angle of the ball valve as it was before the valve was removed.

Where the water is harder than 4 dH, the plate heat exchangers must be cleaned at least every other year. For further information, see “Components”.

NAX053. . . . . .ECO-Introduction.

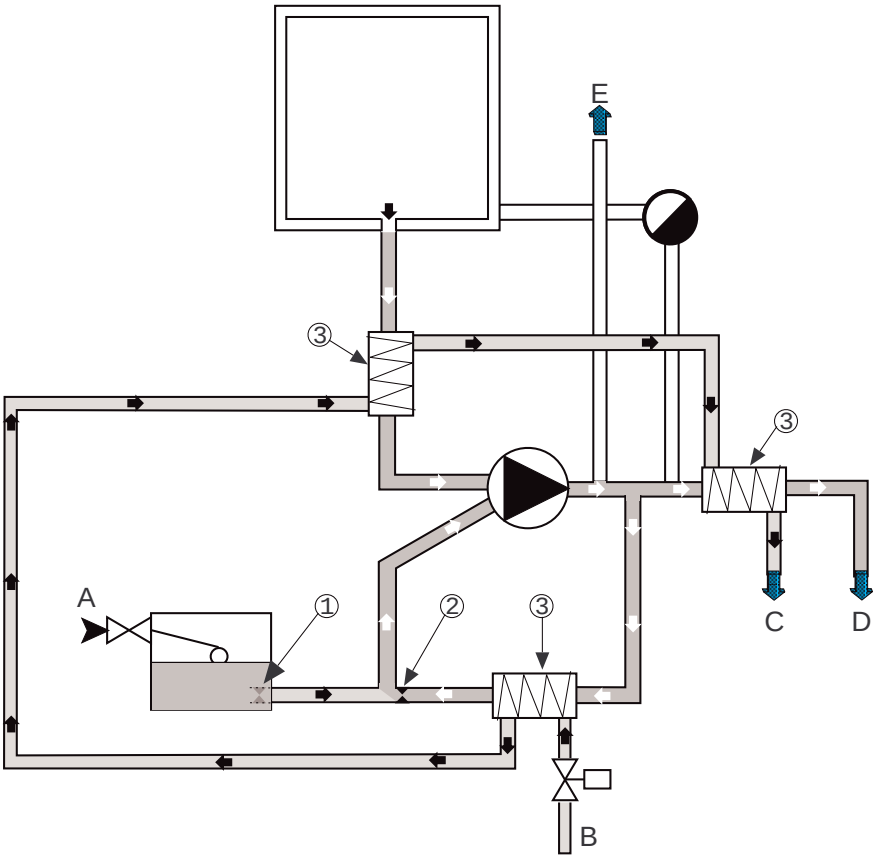
The ECO water-saving system

Pat. pend. PCT/SE94/0099

The sterilizer is fitted with the ECO (economy-ecology) water-saving system. This means that the water systems of the sterilizer are divided up into two separate pipe networks. One system contains water that come into directly or indirect contact with the materials, and has therefore been contaminated. The other system contains water that has been used for cooling in such a way that it is not contaminated and can therefore be used as process water.

The contaminated water is used mainly as sealing water for the vacuum pump, and is circulated in a system where it is cooled and diluted with about one-sixth fresh water from a water tank with an air break to increase the capacity of the pump.

The ECO system reduces water demand by about 40% if the clean process water is not re-used and by about 75% if it is re-used.



A	Cold water
B	Clean process water inlet
C	Clean process water drain
D	Contaminated process water drain
E	Ventilation

NAX054 . . . . . ECO-LEM 25.

1	Fixed throttle 0.6 to 0.8 litres / min.
2	Ball valve 3.0 to 4.0 litres / min.
3	Plate-type heat exchanger

NAX055 . . . . . ECO-LEM 50.

1	Fixed throttle 0.9 litres / min.
2	Ball valve 6.0 to 6.0 litres / min.

3 Plate-type heat exchanger

NAX056. . . . . . ECO-LEM 90.

1 Fixed throttle 1.0 litres / min.

2 Ball valve 8.0 to 9.0 litres / min.

3 Plate-type heat exchanger

NAX078. . . . . . 2066 ECO LEM 50.

1 Fixed throttle 0,7 to 0,9 litres / min.

2 Ball valve 4.0 to 6.0 litres / min.

3 Plate-type heat exchanger (B) > 23 litres / min.

NAX079. . . . . . 2066 ECO LEM 90.

1 Fixed throttle 0,8 to 1,1 litres / min.

2 Ball valve 8.0 to 9.0 litres / min.

3 Plate-type heat exchanger (B) >23 litres / min.

NAX080. . . . . . ECO recovery

Recovery of cooling water

Connections A and B are normally linked, but if the water in the cooling water circuit is to be re-used as process water, then A and B will be separated. Water via connection A will be used exclusively for sealing water for the vacuum pump and, in certain cases, also as feed water for the steam generator.

Connections B and C will have been connected on installation to the special cooling water circuit for re-use, for which the following requirements apply.

- Incoming water pressure (B) must not be higher than 10 bar(e).
- The pressure in the incoming supply main (B) must be at least 3 bar higher than in the return main (C).
- The temperature in the incoming main should not be higher than 20 °C, and the water hardness should not exceed 4 °dH (0.7 mmol/l).

NAX057 . . . . . ECO-Maintenance.

Maintenance

Where the water is harder than 4 dH, fixed throttle 1 and ball valve 2 must be cleaned at least every six months. Note or preferably mark the setting of the ball valve before it is removed. Take care to set the opening angle of the ball valve as it was before the valve was removed.

Where the water is harder than 4 dH, the plate heat exchangers must be cleaned at least every other year. For further information, see “Components”.

NAX081 . . . . . ECO Maintenance

Maintenance

Chokes

Fixed choke (1) and ball valve 2 must be cleaned at least every six months. Note - or preferably mark - the ball valve setting before it is dismantled.

Take care to set the ball valve to the same position after reassembly as it was prior to dismantling.

Settings and inspection

- Adjustment of settings/inspection can most suitably be performed during a process incorporating post-vacuum, as the vacuum pump is then working under stable pressure conditions.
  - Knowing that the distance between the holes is equivalent to a water volume of 0.5 l in the tank, use the feed water tank lid as a measure.
  - Fill the tank to the upper hole.
  - Carefully keeping the float valve in its closed position, use a stopwatch to measure the time for the water level to drop by an amount equivalent to one litre.
    NB: The water level must drop in the tank as a whole. If the tank is divided, it may be necessary to remove the divider in order to ensure this.
  - Calculate the flow capacity through the choke (1) from the formula given below. The capacity must be within the range of the value shown above.
    (measured volume in litres / measured time in seconds) x 60 = litre/min.
  - If necessary, adjust ball valve 2 if the capacity through the fixed choke is not within the specified range.
    Reducing the flow through the ball valve automatically increases

the capacity through choke (1), while increasing the flow through the valve produces an opposite effect.

- Return the equipment to its normal operating state.

Heat exchangers

The plate heat exchangers must be cleaned at least once every two years. Clogging depends very much on the water quality, and particularly on the water hardness. The part of the system that is most inclined to clog is the final heat exchanger prior to outlet C. Clogging causes a reduction in cooling capacity and longer process times.
When the heat exchangers are cleaned, they should also be pressure-tested in order to check that no cracking has occurred.
Cleaning, pressure testing and capacity testing are described in the "Heat exchangers" section of the COMPONENTS chapter.

NAX042. . . . . Sterilizer with dual steam supply. Hosp. div.

Supplementary instructions for sterilizers with double steam systems

The sterilizer has double steam systems, central steam and a built-in steam generator. Normally central steam is used, but in emergencies and where there are problems with the central steam, the built-in steam generator can be switched in.

A steam generator that stands unused for a long time may not work properly when it is needed. To reduce the risk of problems, the following checks should be done before the steam generator is put into service:

Switch off electric power to the sterilizer and steam generator!

1. Check that the connection screws for the power cables to the steam generator and the heating elements are tight.
2. Close the central steam valve.
3. Drain all water from the steam generator. Use the bottom blow-off valve to reduce the level. (If the non-return valve at the steam connection does not seal properly, the steam generator fills slowly but surely with condensate from the central steam.)
4. Switch on the electric power.
5. Press the "Steam generator" button on the electrical control box of the sterilizer.

6. Check that the feed water pump is running correctly by starting it manually using the contactor.

To prevent the feed water pump sticking, it should be started regularly by hand when the electric steam generator is not in use.

7. Set the control switch of the sterilizer to ON.
8. Check that the feed water pump starts and draws water from the water tank.
   Note that the power does not come on until the “Steam generator water level” LED lights up.
9. If the “Steam generator water level” LED does not light up within 40 seconds, an alarm is triggered. This is normal when filling an empty steam generator.
   Reset the alarm.

Take care when working with electrically live equipment.

NAX082 . . . . . Sterilizer with dual steam supply. Hosp. div.

Supplementary instructions for sterilizers with double steam systems

The sterilizer has double steam systems, central steam and a built-in steam generator. Normally central steam is used, but in emergencies and where there are problems with the central steam, the built-in steam generator can be switched in.

A steam generator that stands unused for a long time may not work properly when it is needed. To reduce the risk of problems, the following checks should be done before the steam generator is put into service:

Switch off electric power to the sterilizer and steam generator!

1. Check that the connection screws for the power cables to the steam generator and the heating elements are tight.
2. Close the central steam valve.
3. Drain all water from the steam generator. Use the bottom blow-off valve to reduce the level. (If the non-return valve at the steam con-

nection does not seal properly, the steam generator fills slowly but surely with condensate from the central steam.)

4. Switch on the electric power.
5. Press the “Steam generator” button on the electrical control box of the sterilizer.
6. Check that the feed water pump is running correctly by starting it manually using the contactor.

To prevent the feed water pump sticking, it should be started regularly by hand when the electric steam generator is not in use. Open the drain valve when the feed pump is started manually.

7. Set the control switch of the sterilizer to ON.
8. As the boiler is empty, the “Steam generator fault” alarm will be displayed. Acknowledge the alarm.
9. Refill the boiler using the Reset Level push-button until the lamp in the push-button lights. Check that the feed water pump starts and draws water from the water tank.
   Check carefully that heating power is not turned on before the lamp lights.

Take care when working with electrically live equipment.

NAX043. . . . . Leakage test on the sterilizer chamber. Hosp. div.

Chamber leakage test

The purpose of the leakage test is to reveal leaks in the system that may allow so much air to enter the chamber that the sterilizer may no longer be able to produce sterile goods. The leakage test must be carried out with the sterilizer empty and under vacuum.

Procedure

Connect a calibration pressure gauge which should meet the requirements of the AN285 standard to the VT-connection of the chamber. The calibration pressure gauge must be fitted with a valve so that the connection to the chamber can be shut off as long as there is positive pressure in the chamber. The pressure gauge or printer of the sterilizer can

be used, but with these the accuracy of the readings is limited, giving an uncertain result.

Start one of the standard programs of the control unit and interrupt it with the “EMERGENCY STOP” button after four minutes post-vacuum.

The pressure in the chamber rises for a short period after the program has been stopped; this is not due to leakage but to condensate boiling-off and the temperature/volume change of the newly diluted residual steam.

It is therefore not possible to ascertain that a pressure rise in the chamber is due to a leak until the conditions have stabilised. This takes about 10 minutes.

When the conditions have stabilised, read off the pressure in the chamber. The required interval to the next reading is 10 minutes, but this may need to be extended, depending on the accuracy of the pressure gauge used.

The limit for approval is 1,3 mbar / 10 minutes.

When the test is complete, reset the emergency stop and restart the program; this results in normal conclusion of the process. In through sterilizers, the loading door opens automatically or manually, depending on how the system is programmed.

NAX044 . . . . . Service and spare parts

Service

Contact your local Getinge representative
or
Getinge AB Service Team
International dept.
Phone: +46 35-15 56 36
Fax: +46 35-583 08

Spare parts

Contact your local Getinge representative
or
Getinge AB
Spare parts dept.
Phone: +46 35-15 56 37
Fax: +46 35-15 56 60

NAX091 . . . . . Warranty, service and spare parts

Warranty

Warranty conditions and warranty period are described in the commercial documentation. See the order confirmation that governs the terms of delivery for this unit.

Service

Contact your local Getinge representative
or
Getinge AB ServiceTeam
International dept.
Phone: +46 35-15 56 36
Fax: +46 35-583 08

Spare parts

Contact your local Getinge representative
or
Getinge AB
Spare parts dept.
Phone: +46 35-15 56 37
Fax: +46 35-15 56 60

NAM007 . . . . . SVDB-document GE2044. NO TEXT

NAH005 . . . . . SVDB documents horizontally operated sliding door

SVDB door maintenance schedule

To be noted in protocol	No*1	Yes
Maintenance interval	Monthly	Yearl
Maintenance carried out by		
Check the the limit switch. See page 137.	Operator	Expert
Inspect door seal and groove. See page 134.	Operator	Expert
Lubricate door seal if needed. See page 134.	Technician	
Replace door seal if needed. See page 135.	Technician	
Check the door position and adjust if needed. See page 132.		Expert
Check the door motion and adjust if needed. See page 132.		Expert
Check the door lock and the pneumatic limit switch. See page 136.		Expert
Test the switch-over point of the door seal pressure switch. See page 137.		Expert
Check the electric limit switch. See page 137.		Expert
Test the switch-over point of the chamber pressure switch. See page 138.		Expert
Re-examine the door safety functions. See chapter” Door”.		Expert
Check door motion and locking parts for wear or damage.		Expert
Replace defective parts.		Expert
Finally run a process and observe the door.		Expert

*1. When ”No” is the adding of events in the protocol optional.

GETINGE

SVDB door maintenance protocol

MAINTENANCE PROTOCOL for doors	Page number _____ of _____
Sterilizer identification	
Sterilizer type:	
Manufacturing number:	
SVDB number:	
Installed in:	
Item number:	
Date put into operation:	
Notes:	
SVDB acceptance number: **9363002**	
Tests according to maintenance schedule (specification No. 561 11 84 rev. 0) on previous page	

Maint. interval	Date per-formed	Result of the tests	Author-ization by	Tested by	Date for next test

File: Original or copy shall be filed in the SVDB examination ledger

NAV010. . . . . SVDB documents vertically operated sliding door

SVDB door maintenance schedule

To be noted in protocol	No*1	No	No	Yes
Maintenance interval	Weekly	Monthly	Quarterly	Yearly
Maintenance carried out by				
Test squeeze protection. See chapter 4 page 132.	Opera-tor			Expert
Inspect door seal. See chapter 4 page 134.		Opera-tor		Expert
Replace door seal if needed. See chapter 4 page 134		Techni-cian		
Lubricate door seal if needed. See chapter 4 page 134		Techni-cian		
Check the door position and adjust if needed. See chapter 4 page 132			Techni-cian	Expert
Check door motion and adjust if needed. See chapter 4 page 132			Techni-cian	Expert
Perform squeeze protection safety check. See chapter 4 page 132			Techni-cian	Expert
Perform safety check door and start blocking. See chapter 4 page 424			Techni-cian	Expert
Check safety blocking of the door open-ing. See chapter 4 page 440			Techni-cian	Expert
Re-examine the door safety functions. See chapter 4.				Expert
Check door motion parts for wear or damage.				Expert
Replace defective parts.				Expert
Finally run a process and observe the door.				Expert

*1. When ”No” is the adding of events in the protocol optional.

GETINGE

SVDB door maintenance protocol

MAINTENANCE PROTOCOL for doors	Page number _____ of _____
<u>Sterilizer identification</u>	
Sterilizer type:	
Manufacturing number:	
SVDB number:	
Installed in:	
Item number:	
Date put into operation:	
Notes:	
SVDB acceptance number: **9163004**	
Tests according to maintenance schedule (specification No. 560 81 96 rev. 0) on previous page	

Maint. interval	Date per-formed	Result of the tests	Author-ization by	Tested by	Date for next test

File: Original or copy shall be filed in the SVDB examination ledger

SVDB door maintenance schedule

GEF-449 type sterilizer

Logging	no*1	no	yes
Maintenance interval	weekly	monthly	yearly
Maintenance work / to be carried out by			
Visual inspection of door seal and seal groove. See Chapter 4 page 448.		operator	expert
Lubrication of door seal (where required). See Chapter 4 page 448.		in-house techni-cian	
Replacement of door seal (where required). See Chapter 4 page 451.		in-house techni-cian	
Test door position and if necessary adjust. See Chapter 4 pages 443 and 481.			expert
Test door movement and if necessary adjust. See Chapter 4 page 444.			expert
Safety inspection blocking of media supply to chamber. See Chapter 4 page 464.			expert
Safety check start and door-opening blocking. See Chapter 4 page 481.			expert
Safety check blocking of door actuation. See Chapter 4 page 476.			expert
Testing of door safety mechanisms. See Chapter 4.			expert
Checking of locking components for wear and possible incipient cracks.			expert
Replace defective parts.			expert
Finally, check on operation of quick-closing device.			expert

*1. Where "no" appears, logging is non-mandatory (optional)!

GETINGE

SVDB door maintenance log

MAINTENANCE LOG for quick-closing device	Page _____ of _____
Sterilizer specification	
Designation:	
Factory number:	
SVDB numberr	
Location:	
Item number:	
Date of start-up:	
Remarks:	
SVDB licence number:	
Tests according to maintenance schedule on previous page.	

Maintenance interval	Test date	Test findings	Initials	Name of tester	Next test

Filing: file original or copy in SVDB inspection book

Manual interference in the sterilizing process

When an error like supply medium or component failure occurs during a sterilizing process, this may, after an alarm is emitted, get stuck in a phase from which the control unit can not go further.

The operator can, in some cases, restart the process by pressing the start/restart button. If this isn't possible or doesn't solve the alarm a trained technician have to override the built in safety conditions by manual stepping.

Manual stepping with key switch

When stepping forward in a process program by means of the button C/F9 after setting the key switch , all parameters are controlled by the automatic control unit whereby no dangerous situations can occur. The manually stepping means that the process goes from one process phase to another without time-, temperature- or pressure conditions being fulfilled.

For safety reasons, the possibility to go past a cooling phase or a pressure equalization is blocked, except in some cases when a fault with an analog transducer has occurred. Stepping should preferably be carried out with the process still in alarm phase and before restarting the process.

When stepping past a cooling phase or a pressure equalization, there exist no longer any blockages to prevent dangerous situations from arising. The technician himself has to decide which steps are to be taken.

The manual stepping must only be used by a technician who is well acquainted with the process, the properties of the sterilized goods and the function of the individual sterilizer components.

Fault with an analog transducer

Fault with an analog pressure transducer or temperature sensor stops a proceeding process. In case of a pressure transducer fault, the operator therefore has to step past the pressure conditions at post vacuum, evacuation, natural cooling and pressure equalization. With temperature sensor fault the operator has to step past the corresponding temperature conditions.

Fault with an analog pressure transducer or temperature sensor is indicated only once per process by the control unit.

Pressure transducer fault

PAX036 . . . . . . General hospital OP2, FPC, OPC, OPH

Manual interference in the sterilizing process

When an error like supply medium or component failure occurs during a sterilizing process, this may, after an alarm is emitted, get stuck in a phase from which the control unit can not go further.

Various options are then open to the user. Those that do not involve any danger for the operator are described under the chapter heading “Alarms” in the INSTRUCTION MANUAL. If no options are available to the operator, or if they fail to solve the problem, it will be necessary to call in the services of a trained technician to step forward the program manually.

Manual stepping means that, under certain conditions, a technician can step past integral safety features.

Manual stepping with key switch

When manually stepping forward a program using the C/F9 key, after turning the key switch to the Stepping position, all parameters remain under the control of the automatic control equipment, so that dangerous situations should not normally arise. Manually stepping steps the process from one phase to the next without temperature, time or pressure conditions necessarily being fulfilled.

For safety reasons, the possibility to go past a cooling phase or a pressure equalization is blocked, ***except in some cases when a fault with an analog transducer has occurred***. Stepping should preferably be carried

out with the process still in alarm phase and before restarting the process.

When stepping past a cooling phase or a pressure equalization, there exist no longer any blockages to prevent dangerous situations from arising. The technician himself has to decide which steps are to be taken.

The manual stepping must only be used by a technician who is well acquainted with the process, the properties of the sterilized goods and the function of the individual sterilizer components.

Fault with an analog transducer

In the event of a fault in an analogue pressure or temperature sensor while a process is in operation, the process will stop. Faults of this type do not allow the process to be restarted, as the sensor fault persists after acknowledgement, although it will not be re-displayed. Faults in analogue sensors also mean that the pressure or temperature regulators are put out of action, which in turn means that neither temperatures, pressures or ramped pressure changes can be controlled. In addition, pressure sensor faults mean that the operator must step past the pressure conditions relating to post-vacuum, evacuation, natural cooling and pressure equalisation. Similarly, for temperature sensor faults, the operator will have to step past corresponding temperature conditions.

PAX037 . . . . . Hospital steri. withOP2 and more than 6 programs

As described below, the program in programs with program selection buttons on the operator's control panel can be switched straight through to posttreatment using the program selection push-button and then stepping it forward with the stepping key turned to its lower position. Programs that have no program selection push-button must instead be stepped right through to post-treatment.

PAX005 . . . . . Sterilizer with vacuum process

Program with post vacuum.

- Step to the post vacuum phase.
  NOTE! The process will perform a normal post vacuum. If a ramp is needed it has to be controlled by manually operating the vacuum valve.
- When a required vacuum is reached, step to the pressure equalization phase.

- Raise the chamber pressure to atmospheric pressure by opening the valve to the air-in filter or the valve for support pressure. Check the chamber pressure gauge.
- Step past the pressure equalization phase. (Contact Getinge AB for instructions)

PAX031 . . . . . Sterilizer with vacuum process

Program with post vacuum.

- Step to the post vacuum phase.
  NOTE! The process will perform a normal post vacuum. If a ramp is needed it has to be controlled by manually operating the vacuum valve.
- When a required vacuum is reached, step to the pressure equalization phase.
- Raise the chamber pressure to atmospheric pressure by opening the valve to the air-in filter or the valve for support pressure. Check the chamber pressure gauge.
- Step past the pressure equalization phase.
  (NOTE! possible only with pressure transducer fault)

PAX006 . . . . . Sterilizer with program for liquids

Program with cooling

- Step to the cooling phase.
- Restart the process.
- Control the chamber pressure, by manually operating the solenoid valve for support pressure. When the load is cooled down, the process will automatically go to pressure equalization phase.
- Pressure equalize the chamber to atmospheric pressure by manually operating the solenoid valve controlling the drain valve. Check the chamber pressure gauge
- Step past the pressure equalization phase. (Contact Getinge AB for instructions).

PAX032 . . . . . Sterilizer with program for liquids

Program with cooling

- Step to the cooling phase.
- Restart the process.
- Control the chamber pressure, by manually operating the solenoid valve for support pressure. When the load is cooled down, the process will automatically go to pressure equalization phase.

- Pressure equalize the chamber to atmospheric pressure by manually operating the solenoid valve controlling the drain valve. Check the chamber pressure gauge
- Step past the pressure equalization phase.
  (NOTE! possible only with pressure transducer fault).

PAX007 . . . . . Sterilizer with temp. sensor

Temperature Sensor fault

The process can be restarted if only one of the load sensors is broken. The process will then disregard the faulty sensor and go on from the point where the fault occurred.
Follow the instructions below if there is only one load sensor or more than one is faulty.

PAX008 . . . . . Sterilizer with vacuum process

Program with post vacuum

- Step to the post vacuum phase.
- Restart the process.
- The process will be automatically ended.

PAX009 . . . . . Sterilizer with program for liquids

Program with cooling

- Step to the cooling phase.
- Restart the process.
- Make sure that the load has been cooled down to a safe temperature when the minimum cooling time has expired.
- Step past the cooling phase (Contact Getinge AB for instructions)
- The process will end automatically.

PAX033 . . . . . Sterilizer with program for liquids

Program with cooling

- Step to the cooling phase.
- Restart the process.
- Make sure that the load has been cooled down to a safe temperature when the minimum cooling time has expired.

- Step past the cooling phase
  (NOTE! possible only with pressure transducer fault)

- The process will end automatically.

PAX034 . . . . . . Sensor fault, independent system

Sensor fault, independent system

In case the process is stopped in a cooling- or door opening phase, due to failure of the independent sensors, the safety system can be by-passed by manual operation of the safety relays.
See the electric wiring diagram.

PAX012 . . . . . . GEE, General

Manual interference in the sterilizing process

When an error like supply medium or component failure occurs during a sterilizing process, this may, after an alarm is emitted, get stuck in a phase from which the control unit can not go further. There are two alternatives of handling the fault given in the operating instruction.
The first alternative is intended to be used by the operator and will not involve any dangerous moments.
The second alternative: A trained technician manually overrides the built in safety conditions and brings the process to its end.

Manual stepping with key switch

When stepping forward in a process program by means of the button C/F9 after turning the key switch Stepping, all parameters are controlled by the automatic control unit whereby no dangerous situations can occur. The manually stepping means that the operator goes from one process phase to another without time-, temperature- or pressure conditions being fulfilled. For safety reasons, the possibility to go past a pressure equalization or the gas removal stage is blocked.

Fault with an analog transducer.

Fault with an analog pressure transducer stops a proceeding process. The control system will automatically go to an emergency evacuation.

Also a fault with an analog temperature sensor stops a proceeding process. The control system will, in this case, automatically go to the Alarm Phase. It will stay in the alarm phase until the operator/technician has repaired the fault and manually stepped back into the main program.

Manual control by actuating the control valves

Manual actuating of control valves can be done when a system error occurs which keeps the process stuck in one phase.

When using this method, there exists no longer any blockages to prevent dangerous situations from arising. The technician himself has to decide which steps are to be taken.

The above captioned method must only be used by a technician who is well acquainted with the process, the properties of the sterilized goods and the function of the individual sterilizer components.

Open the door manually

The following, important steps, has to be taken into consideration before a door is manually opened

1. **Make sure, beyond all doubts**, that the valve you are going to manipulate is the correct one.
2. Drain, by manually opening a drain valve, the chamber from liquids that might flow out when opening a door.
3. Relive pressure from the chamber by manually opening a drain valve.
4. If sterilizer load consists of liquids, make sure that the temperature of the liquid is well below its boiling point.

Open the door manually

The following, important steps, should be noticed before a door is manually opened

1. **Make sure, beyond all doubts**, that the valve you intend to manipulate is the correct one.
2. Relive pressure from the chamber by manually opening the drain valve.

Beware of poisonous gas!

3. Ventilate gases not allowed escaping from the chamber when opening the door.

Manual interference in the sterilizing process

When an error like supply medium or component failure occurs during a sterilizing process, this may, after an alarm is emitted, get stuck in a phase from which the control unit can not go further.

There are three alternatives to handle the fault given in the operating instruction. Number 1 and 2 of these are intended to be used by the operator and will not involve any dangerous moments.

The third alternative: A trained technician can manually override the built in safety conditions and bring the process to its end.

Manual stepping with key switch

When stepping forward in a process program by means of the button **C** after setting the key switch SK04, all parameters are controlled by the automatic control unit whereby no dangerous situations normally can occur.

The manually stepping means that the operator goes from one process phase to another without time-, temperature- or pressure condition being fulfilled. For safety reasons, the possibility to go past a pressure equalization is blocked ***except when a fault with an analog transducer has occurred***.

When using this method, there exist no longer any blocking to prevent dangerous situations from arising. The technician himself has to decide which steps are to be taken.

The above captioned method must only be used by a technician who is well acquainted with the process, the properties of the sterilized goods and the function of the individual sterilizer components.

FAULT WITH AN ANALOG TRANSDUCER
Fault with an analog pressure transducer or temperature sensor stops a proceeding process. These faults do not allow for repeated start of the process. A push on the aborted process program selector button directs the process to the appropriate post treatment phase. The transducer fault remains but will not be indicated a second time. All regulators wi become inactivated. In case of a pressure transducer fault, the operator therefore has to step past the pressure conditions at post vacuum, evacuation, steam inlet and pressure equalization. With temperature sensor fault the operator has to step past the corresponding temperature conditions.

PAX015 . . . . . General. Pressure transducer fault. Hosp. div.

PRESSURE TRANSDUCER FAULT
Post vacuum (The ramp regulator does not start).

- Jump to the end using the program selector button.
- Step past all programmed vacuum- and pressure-values.
- Wait until atmospheric pressure is established in the chamber.
- Step past the pressure equalization phase.

PAX038 . . . . . General. Pressure transducer fault. OP2, FPC. Hospital division.

PRESSURE TRANSDUCER FAULT
Post vacuum (The ramp regulator does not start).

1. Jump to the end of the program using the program selector button, or step to it if there is no program selector button.
2. Step past all programmed vacuum and pressure values when the correct vacuum has been reached.

3. Wait until atmospheric pressure is established in the chamber.
4. Step past the pressure equalization phase.

PAX016 . . . . . Natural cooling. Hosp. div.

Natural-cooling

- Jump to the end using the program selector button.
- Press the C-button.
- Press the START button.
- Wait until the temperature of the goods has fallen to the programmed value for cooling temperature.
- Wait for atmospheric pressure in the chamber.
- Step past the pressure equalisation phase.

PAX039 . . . . . Steri with program for natural cooling OP2, FPC

Natural-cooling

1. Jump to natural cooling using the program selector button, or step to that phase if there is no program selector button.
2. Restart the process.
3. Step to the next phase when the load temperature reaches 105° C. The pump starts.
4. Wait until the load temperature has fallen to the programmed value for cooling temperature and then step forward to pressure equalisation.
5. Wait for atmospheric pressure in the chamber.
6. Step past the pressure equalisation phase.

PAX040 . . . . . Steri with formaldehyde program OP2, FPC

Formaldehyde program

1. Jump to the post-vacuum phase using the program selector button, or step to that phase if there is no program selector button.
2. Step past the pressure conditions for post-vacuum, steam inlet and air pulses. Check that the sterilisation temperature and pressure are not exceeded.

Try to mimic the process format as much as possible in order to avoid the release of formalin on conclusion of the process.

3. Wait for the chamber pressure to reach atmospheric after pressure equalisation.
4. Step past the pressure equalisation phase.

PAX017 . . . . . General. Temp. sensor fault. Hosp. div

TEMPERATURE SENSOR FAULT
Post vacuum (The steam regulator does not start)

- Jump to the end using the program selector button. The process will be automatically ended.

PAX041 . . . . . General. Temp. sensor fault OP2, FPC. Hospital division.

TEMPERATURE SENSOR FAULT
Post vacuum (The steam regulator does not start)

1. Jump to the post-vacuum using the program selector button, or step to that phase if there is no program selector button.
2. The process will terminate automatically.

PAX018 . . . . . Sterilizer with program for natural cooling.
Natural-cooling

- Jump to the end using the program selector button.
- Try to step past the cooling phase after the condition chamber pressure = -0.15 bar (e).
- If unsuccessful, repeat the attempt at intervals of about one minute until successful.
- Wait for the air flow phase.
- Step past the ending temperature condition. The process comes to an end automatically.

PAX042 . . . . . Sterilizer with program for natural cooling OP2, FPC

Natural-cooling

1. Jump to natural cooling using the program selector button, or step to that phase if there is no program selector button.
2. Restart the process.
3. Attempt to step past the cooling phase after the chamber pressure condition (-0.25 bar(e)) has been achieved.
4. If unsuccessful, repeat the attempt at intervals of about one minute until successful.
5. Wait for the air flow phase.
6. Step past the ending temperature condition. The process comes to an end automatically.

PAX043 . . . . . Formaldehyde program

Formaldehyde program

- This program will be concluded automatically by emergency termination.

PAX063. . . . . Power failure with door open

Power failure alarm with door open

If a sterilizer door is partly or wholly open, an alarm will be generated for safety reasons after a power failure. The doors must therefore always be closed when the control power supply is turned off.

PAX044 . . . . . Interlock fault. General

External safety interlock fault

The sterilizer is fitted with an automatic monitoring system for the external components that are used independently of the control system as safety interlocks.
If the external components had changed their settings, locked up or constantly indicated “safe”, this would not normally have been observed during operation. It would not be until it was too late, and the control system had also failed (i.e. when the external components were needed for their safety purpose) that such failure would have been discovered.
The objective of the supervisory system is to ensure proper performance of both safety systems, to permit such operations as admitting other media to the chamber or opening the door.
This external monitoring system is provided by a relay system connected to both the external components and to the control system. At certain pre-programmed points before and during the process, the monitoring system checks that the respective external components have opened or closed their contacts as expected.
If the relay information does not accord with the control system's own information, the discrepancy is stored by the control system until the process is concluded.
On conclusion of the process, an alarm is generated and a text message indicates the type of interlock fault (see also the section entitled “Fault codes” in the OPERATION chapter of the Instruction Manual).
This alarm cannot be reset in the normal manner, and a new process cannot be started as long as the alarm is active.

INTERLOCK FAULTS

1. Cancel the acoustic signal by pressing the C/F10 push-button.

2. Rectify the faulty component.
3. Activate the stepping key and reset the alarm using the C/F10 push-button.
4. Set and check the performance of the component, as described in the DOOR chapter or under the heading “Liquid sterilisation” in this chapter, depending on the component concerned.
5. Check that interlock faults have not been activated after completion of a process.

PAX019 . . . . . Back-up battery fault.

Backup battery fault

In the event of a fault in the backup battery, an alarm is triggered. The process is ended and the control system returns to a rest phase. In this mode, no parameters or program sequences have been lost. Data is only lost if the power supply to the control system fails either by being switched off with the control switch or as a result of a power failure.

Before shutting down:

- Using an OPC, print out the sequence programs and parameters.
- Save the programs to disk so that they can be loaded again after the battery has been replaced.
- Switch of the control current and call a technician to replace the battery.

When operating voltage is lost:
If the voltage of the backup battery is low, and a power failure occurs during a process, all software will be lost. After a power failure of this type the display reads “P0” (Program 0).

The control system can no longer control the process; instead the sterilizer must be brought to a safe state under manual control. See the description of the menus 8701-8764 under “Control system PAC 2000”.

In this case there are no blocks that prevent dangerous situations arising. Here it is left entirely to the technician to determine what actions are permitted.

The method referred to in the heading must only be used by technicians who are thoroughly familiar with the process, the properties of the goods to be sterilized and the operation of the individual sterilizer components.

Backup battery fault

In the event of a fault in the backup battery, an alarm is triggered. The process is ended and the control system returns to a rest phase. In this mode, no parameters or program sequences have been lost. Data is only lost if the power supply to the control system fails either by being switched off with the control switch or as a result of a power failure.

Before shutting down:

- Using an OPC, print out the sequence programs and parameters.
- Save the programs to disk so that they can be loaded again after the battery has been replaced.
- Switch of the control current and call a technician to replace the battery.

When operating voltage is lost:
If the voltage of the backup battery is low, and a power failure occurs during a process, all software will be lost. After a power failure of this type the display / monitor reads “P0” (Program 0).

The control system can no longer control the process; instead the sterilizer must be brought to a safe state under manual control. See the description under “CONTROL UNIT PACS 2000”.

In this case there are no blocks that prevent dangerous situations arising. Here it is left entirely to the technician to determine what actions are permitted.

The method referred to in the heading must only be used by technicians who are thoroughly familiar with the process, the properties of the goods to be sterilized and the operation of the individual sterilizer components.

NB: If the EPROM in the control unit is to be used to restore the software by means of a cold start, after the sterilizer has been brought to a safe state, all changes and calibrations performed after delivery will be erased.

Restoring software from E-PROM (cold start)

A cold start may only be carried out with the sterilizer in the safe position and by a technician who is thoroughly familiar with the sterilizer process. Read the warning below and then the cold-starting instructions in the chapter on CONTROL UNIT PACS2000.

Warning

When programs are loaded from PC or a cold start is performed from the E-PROM, the system will end up in the stand-by phase, which means that risky situations may arise.

Before loading/cold start can take place, the sterilizer must be put in the resting phase or manually transferred to a non-dangerous position in which the vessel is drained of any water and/or condensation, is pressure-less and any liquid loads have cooled. See also the separate instructions for manual handling contained in this chapter.

A cold start from the E-PROM means that old values will appear for settings which have been changed in the RAM.
In a similar way saved, old values are loaded from PC. This necessitates updating any changes and calibration values. Calibration values from the latest calibration for analogue sensors must also be entered.

Opening the door manually

The following, important steps, has to be taken into consideration before a door is opened after manual interference.

1. Make sure, beyond all doubts, that the valve you are going to manipulate is the correct one.
2. Drain, by opening a drain valve, the chamber from liquids that might flow out when opening the door.
3. Relive pressure from the chamber by opening a drain valve.

4. If sterilizer load consists of liquids, make sure that the temperature of the liquid is well below its boiling point.

PAX046 . . . . . Manually opening the door general

Opening the door manually

The following, important steps, has to be taken into consideration before a door is opened after manual interference.

- Make sure, beyond all doubts, that the valve you are going to manipulate is the correct one.
- Drain, by opening a drain valve, the chamber from liquids that might flow out when opening the door.
- Relive pressure from the chamber by opening a drain valve.
- If performing formalin processes, evacuate any gas that cannot be permitted to escape through the door when it is opened. See also the section “General advice for formalin sterilizers” in the INSTRUCTION MANUAL.
- If sterilizer load consists of liquids, make sure that the temperature of the liquid is well below its boiling point.

PAX028 . . . . . Monitoring the load temp. when sterilizing liquids. Hosp. div.

Monitoring the load temperature when sterilizing liquids

If the door of a sterilizer, containing a load of liquids, is opened before the liquid temperature has fallen below a certain maximum, closed bottles may explode while open vessels boil over. The course may develop violently with great danger to human life and technical equipment.

Safety arrangements

A temperature sensor in the load senses the liquid temperature and takes part in the control of the process by keeping the sterilizer doors closed

until the temperature is safely below the boiling point of the liquid. An alarm will be emitted in case of a break or short circuit in the sensor.

Safety check

Because the connection wire and its joint to the sensor element is regarded as the weakest part of the measuring system, the check is limited to following points:

- Place the load sensor close to the chamber temperature sensing element (with steam sterilizers the one in the drain and with formaldehyde sterilizers the one near the chamber wall).
- Check on the display, during the sterilization phase, that the deviation between the two sensors is less than ±0,5 ^{o}C

PAX047 . . . . . Monitoring the load temp. Prog. for liquids Hosp.div.

Monitoring the load temperature when sterilizing liquids

If the door of a sterilizer, containing a load of liquids, is opened before the liquid temperature has fallen below a certain maximum, closed bottles may explode while open vessels boil over. The course may develop violently with great danger to human life and technical equipment.

Load sensor

A temperature sensor in the load senses the liquid temperature and takes part in the control of the process by keeping the sterilizer doors closed until the temperature is safely below the boiling point of the liquid. An alarm will be emitted in case of a break or short circuit in the sensor.

Safety check
Because the connection wire and its joint to the sensor element is regarded as the weakest part of the measuring system, the check is limited to following points:

1. Place the load sensor close to the chamber temperature sensing element (with steam sterilizers the one in the drain and with formaldehyde sterilizers the one near the chamber wall).
2. Check on the display / monitor, during the sterilization phase, that the deviation between the two sensors is less than ±0,5 ^{o}C

PAX029 . . . . . Blocking opening of thedoor. Hosp. div.

Safety blocking of door opening.

Designations on the components described below, as well as inputs and outputs, are shown on the electrical connection diagrams of the sterilizer.

Interlocking
A holding relay breaks the connection between the control system and the door locking function, thus ensuring that the door remains locked until the conditions in the chamber are safe. The coil of the holding relay is energised by one of the outputs of the control system. The relay is held in by its remanence function until it has been reset in one of the ways described below.

Via the other relay contact the control system is fed with a signal to one of the inputs. With the aid of this signal, the control system moni-

tors that the holding relay is energised from the first inlet of steam to the chamber until the start after post-treatment. This is also a check of the serviceability of the holding relay, since failed or interrupted indication results in an alarm via the control system.

Resetting in the case of a textile or utensil program
One output is activated to reset the holding relay during post-treatment in all processes except those intended for the sterilization of liquids. The supply passes over a pressure switch that is separate from the control system and which only allows the signal to pass on to the holding relay when the pressure in the chamber has fallen below -0.3 bar(e). The door interlocking function can then be influenced by the control system. This normally happens when the process is finished and there is atmospheric pressure in the chamber.

Resetting in the case of liquid programs
In all liquid processes, the holding relay is reset via an output that is normally activated during the self-cooling or the jacket cooling.

The resetting signal is interlocked via a thermostat that is separate from the control system and which only allows resetting of the holding relay when the set temperature of 95 °C or 80 °C respectively.

As already mentioned, the holding relay and thus the operation of the thermostat are checked for correct operation by means of a signal to the control system when the cooling phase begins. This signal is also used in the process to synchronize the monitoring system with the temperature measurement of the control system so that the cooling process continues until both systems indicate the permitted finishing temperature.

On cable breakage or power failure, the thermostat always indicates that the temperature is too high, thus preventing incorrect resetting when the supply is restored.

Duplication of resetting interlock
The purpose of the interlock via the -0.3 bar(e) pressure switch is to prevent unwanted resetting of the holding relay when the control system stops working, as follows:

If the output that is normally used for resetting on sterilization of solid materials is activated during a process with self-cooling for liquids, the holding relay cannot be reset until the pressure switch has reached the set pressure (-0.3 bar(e)). This ensures that, with self-cooling programs by boiling-off, the fluid temperature has fallen far below the stipulated 95 °C, which is otherwise the limit for resetting of the holding relay. Fluid programs with jacket cooling has support pressure in the chamber during the cooling phase; this prevents the pressure from falling so low that accidental resetting can take place.

Setting the door interlock - safety system

The settings that may have to be made are the closing point of the temperature measuring device (TS17) and the resetting point of interlock pressure switch PS21/2 (connector interface 1 on PS21).

Setting the interlock pressure switch

- Fit a needle valve to the VT connection of the chamber.
- Remove the cover from PS21 and start a program with prevacuum.
- Stop the process with the emergency stop during the first vacuum signal when the pressure in the chamber, as indicated by the pressure gauge on the front of the sterilizer, has fallen below -0.5 bar(e).
- Screw in the adjusting screw of PS21/2 (clockwise) until the contact is heard to operate.
- Open the needle valve and allow air to enter the chamber until a chamber pressure of -0.3 bar(e) is indicated on the display of the operator panel.
- Unscrew the adjusting screw of PS21/2 (anticlockwise) until the contact is heard to operate.
- Acknowledge the fault with the “C” button and terminate the program.

Safety check:

- Choose menu 8600 “Test of digital input” (see “Control system PACS 2000”).
- Choose the menu display that shows DI 12. Start a program with pre- and post-vacuum and check that the input is not activated until steam is admitted to the chamber.
- During the post-vacuum phase, check that the input is not reset until the pressure in the chamber has fallen to -0.3 bar(e).

Note that certain menus on this level contain options that can disable the checking and security functions of the sterilizer. Study the sections about the control system in the manual!

Setting the temperature measurement device:

- The sterilizer must be in stand-by mode, i.e. with power on but no program started.
- Heat up an oil bath to the temperature in question. In an emergency a water bath may be used. For checking programs with self-cooling, the temperature must be 95 °C and for programs with jacket cooling 80 °C. Use an accurate thermometer to check the temperature of the bath.

- Take out the load temperature sensor and place it in the bath.
- Check that the hysteresis setting on temperature control device TS17 is set to minimum.
- Turn down the temperature setting on TS17 until the indicator lamp goes out.
- Slowly turn up the temperature setting on TS17 until the lamp light up.
- Check on the operator panel that the load temperature is the same as the current temperature of the bath.
- Wipe the oil off the load temperature sensor and return the sensor to the holder in the sterilizer.

Safety check:

- Place the load sensor in a container of water and start a liquid program.
- With a process running, check that the indicator lamp on temperature control device TS17 lights up when the temperature passes 95 °C or 80 °C, respectively. The temperature of the load sensor can be seen on the operator panel.

PAX048 . . . . . General EN-sterilizer Hospital division

Safety blocking of door opening when sterilizing liquids.

Designations on the components described below, as well as inputs and outputs, are shown on the electrical connection diagrams of the sterilizer.

PAX049 . . . . . Blocking of the door EN Not supervisor 2 or 3. Hosp. division

Interlocking relay

A holding relay breaks the connection between the control system and the door locking function, thus ensuring that the door remains locked until the conditions in the chamber are safe. The coil of the holding relay is energised by one of the outputs of the control system. The relay is held in by its remanence function until it has been reset in one of the ways described below.

Via the other relay contact the control system is fed with a signal to one of the inputs. With the aid of this signal, the control system moni-

tors that the holding relay is energised from the first inlet of steam to the chamber until the start after post-treatment. This is also a check of the serviceability of the holding relay, since failed or interrupted indication results in an alarm via the control system.

Resetting in the case of a textile or utensil program
One output is activated to reset the holding relay during post-treatment in all processes except those intended for the sterilization of liquids. The supply passes over a pressure switch that is separate from the control system and which only allows the signal to pass on to the holding relay when the pressure in the chamber has fallen below -0.3 bar(e). The door interlocking function can then be influenced by the control system. This normally happens when the process is finished and there is atmospheric pressure in the chamber.

Temperature sensor

In all liquid processes, the holding relay is reset via an output that is normally activated during the self-cooling or the jacket cooling.

The resetting signal is interlocked via a thermostat that is separate from the control system and which only allows resetting of the holding relay when the set temperature of 95 °C or 80 °C respectively.

As already mentioned, the holding relay and thus the operation of the thermostat are checked for correct operation by means of a signal to the control system when the cooling phase begins. This signal is also used in the process to synchronize the monitoring system with the temperature measurement of the control system so that the cooling process continues until both systems indicate the permitted finishing temperature.

On cable breakage or power failure, the thermostat always indicates that the temperature is too high, thus preventing incorrect resetting when the supply is restored.

Pressure sensor

The purpose of the interlock via the -0.3 bar(e) pressure switch is to prevent unwanted resetting of the holding relay when the control system stops working, as follows:

If the output that is normally used for resetting on sterilization of solid materials is activated during a process with self-cooling for liquids, the holding relay cannot be reset until the pressure switch has reached the set pressure (-0.3 bar(e)). This ensures that, with self-cooling programs by boiling-off, the fluid temperature has fallen far below the stipulated 95 °C, which is otherwise the limit for resetting of the holding relay. Fluid programs with jacket cooling has support pressure in the chamber during the cooling phase; this prevents the pressure from falling so low that accidental resetting can take place.

Adjusting the door interlock safety system

The settings that may have to be made are the closing point of the temperature measuring device (TS17) and the resetting point of interlock pressure switch PS21/2 (connector interface 1 on PS21).

Setting the interlock pressure switch

1. Fit a needle valve to the VT connection of the chamber.
2. Remove the cover from PS21 and start a program with prevacuum.
3. Stop the process with the emergency stop during the first vacuum signal when the pressure in the chamber, as indicated by the pressure gauge on the front of the sterilizer, has fallen below -0.5 bar(e).
4. Screw in the adjusting screw of PS21/2 (clockwise) until the contact is heard to operate.
5. Open the needle valve and allow air to enter the chamber until a chamber pressure of -0.3 bar(e) is indicated on the display of the operator panel.
6. Unscrew the adjusting screw of PS21/2 (anticlockwise) until the contact is heard to operate.
7. Acknowledge the fault with the “C / F10” button and terminate the program.

Safety check:

1. Select the Digital Inputs test menu (see the PACS 2000 CONTROL UNIT chapter).
2. Start a program with pre-vacuum and post-vacuum, and check that input DI 11 is not activated before steam is admitted to the chamber.
3. During the post-vacuum phase, check that the input is not reset until the pressure in the chamber has fallen to -0.3 bar(e).

Note that certain menus on this level contain options that can disable the checking and security functions of the sterilizer. Study the sections about the control system in the manual!

Safety check:

1. The sterilizer must be in stand-by mode, i.e. with power on but no program started.
2. Heat up an oil bath to the temperature in question. In an emergency a water bath may be used. For checking programs with self-cooling, the temperature must be 95 °C and for programs with jacket cooling 80 °C. Use an accurate thermometer to check the temperature of the bath.
3. Take out the load temperature sensor and place it in the bath.

4. Press the red push-button on TS17 in order to see the temperature setting. At the same time, using a small screwdriver, turn the temperature setting down until the indicating lamp goes out. Do this very carefully, as the setting is very sensitive.
5. Slowly turn up the temperature setting on TS17 until the lamp light up.
6. Check on the operator panel that the load temperature is the same as the current temperature of the bath. Note that the hysteresis of TS17 can mean that the temperature shown on the display can differ by about 1 °C from the other temperatures.
7. Wipe the oil off the load temperature sensor and return the sensor to the holder in the sterilizer.

Safety check:

1. Place the load sensor in a container of water and start a liquid program.
2. While the process is in operation, check that the TS17 temperature indicating light goes out when the temperature exceeds 95 °C or 80 °C respectively. The temperature indicated by the sensor can be read off on the operator's panel.

Supervisor

Before the independent door lock can be released, the temperature as indicated by the independent Supervisor load temperature sensor have fallen to a safe level. Only then will the door interlock, which is performed by DO 66 on the DOI circuit board of the supervisory system, be released.

That DOC 66 is activated also means that one of the conditions for termination of cooling has been fulfilled. This is done by DO 66 activating a relay which, in turn, provides an input to digital input DI 11 of the control system. The signal at this input is used to synchronise the requirements of the control system and of the Supervisor for continued cooling.

During a process intended for closed containers, and incorporating forced cooling, DO 66 will be activated when the temperature is less than 80 °C.

During a process for liquids in open containers, and where the contents of the chamber are left to cool naturally, or where the contents are cooled by pressure reduction, DO 66 will be activated when the temperature falls below 95 °C.

Adjustment
The Supervisor safety interlock is not adjustable, as the temperature limits for releasing the door interlock are programmed into the software.

Temperatures are measured by a dedicated Pt-100 sensor. However, a defective or incorrectly calibrated sensor can threaten the safety of the interlocking.

Safety checking

1. Start a process.
2. Check that DO 66 is extinguished and that DI 11 is activated during sterilisation in a program having a sterilisation temperature above 110 °C.
3. During the natural cooling or controlled cooling period, check that DO 66 is not activated, and that DI 11 is not extinguished, until the load temperature as indicated by the control system has fallen to a safe level. The two values of this safe level are stated above for the respective type of process, and the error must not exceed.
   Read all the values on the control system display panel, and not on the supervisory system control panel. If the values are taken from PACS Supervisor, it will not be possible to decide whether or not the system needs to be calibrated.

(NB: There may be a few seconds' delay in the readings between the PACS Supervisor and the PACS 2000 control system.)
Calibrate the supervisory system sensors if necessary.

PAX064 . . . . . Safety blocking Supervisor 2 or 3

Supervisor

Before the independent door lock can be released, the temperature as indicated by the independent Supervisor load temperature sensor have fallen to a safe level. Only then will the door interlock, which is performed by DO 68 on the DOI circuit board of the supervisory system, be released.

That DO 68 is activated also means that one of the conditions for termination of cooling has been fulfilled. This is done by DO 68 activating a relay which, in turn, provides an input to digital input DI 11 of the control system. The signal at this input is used to synchronise the requirements of the control system and of the Supervisor for continued cooling.

During a process intended for closed containers, and incorporating forced cooling, DO 68 will be activated when the temperature is less than 80 °C.

During a process for liquids in open containers, and where the contents of the chamber are left to cool naturally, or where the contents are cooled by pressure reduction, DO 68 will be activated when the temperature falls below 95 °C.

Adjustment
The Supervisor safety interlock is not adjustable, as the temperature limits for releasing the door interlock are programmed into the software.

Temperatures are measured by a dedicated Pt-100 sensor. However, a defective or incorrectly calibrated sensor can threaten the safety of the interlocking.

Safety checking

1. Start a process.
2. Check that DO 68 is extinguished and that DI 11 is activated during sterilisation in a program having a sterilisation temperature above 110 °C.
3. During the natural cooling or controlled cooling period, check that DO 68 is not activated, and that DI 11 is not extinguished, until the load temperature as indicated by the control system has fallen to a safe level. The two values of this safe level are stated above for the respective type of process, and the error must not exceed.
   Read all the values on the control system display panel, and not on the supervisory system control panel. If the values are taken from PACS Supervisor, it will not be possible to decide whether or not the system needs to be calibrated.

(NB: There may be a few seconds' delay in the readings between the PACS Supervisor and the PACS 2000 control system.)
Calibrate the supervisory system sensors if necessary.

PAA001 . . . . . New steam generator

Care of the steam generator

Care and maintenance of the steam generator are decisive for the performance and safety of the sterilizer. Wrongly maintained, it can cause problems of various types and complexity, sometimes difficult to associate with the steam generator.

Emptying/Blowdown

It is extremely important to observe the prescribed emptying intervals for the water content of the steam generator. The length of these intervals depends on whether the steam generator is supplied with untreated or softened water or if it is supplied with de-ionised water.
When using either untreated or softened water, the boiler must be emptied each week during normal operation. During a week's use, concentrations of salts, chlorides, phosphates and metals in the steam generator water rise by about ten times. By the end of the week, the 300 µS/cm at the beginning of the week can have risen to 3000 µS/cm.
When using de-ionised water, it is sufficient to drain the steam generator once a month or even quarterly, depending on whether the boiler is fitted with manual or automatic blow-down.
For more information on draining the boiler, or on the effect of water quality, see the chapter entitled MAINTENANCE in this manual and the section entitled “Feed water for the steam generator” in the INSTALLATION chapter of the INSTRUCTION MANUAL.

Common secondary faults arising from failure to empty or blow down the steam generator

- Too high a conductivity of the water will give rise to acute level control problems. This will bring up the “Steam Generator Fault” alarm and, if ignored, a risk of boiling dry.
- The build-up of certain substances produces non-condensable gases in the steam, thus influencing the integrity of sterilisation performance.
  A visible indicator of gases is provided by the water in the sight glass pulsing up and down even when the steam supply is nonexistent. On the other hand, a stationary water level is no guarantee of gas-free steam.
  See the section “Every quarter” in the MAINTENANCE chapter, describing how the sight glass can be blown clean.
- For the same reason, the Bowie-Dick tests can be adversely affected.
- Enrichment of chlorides, salts and carbonates can cause corrosion of the steam vessel, the immersion heater, the chamber or sterilised articles, and also break down the door seal.
- A build-up in the concentration of certain metals and minerals results in deposits in the chamber and on sterilised items.

- The use of untreated/softened water forms a sludge in the bottom of the steam generator, which can build up and cause the immersion heater to burn out.
- The use of untreated water creates lime deposits in the steam generator.

Maintenance of the water level

Safety requirements for larger steam generators do not allow them to be refilled to the original level automatically if they drop below the lowest permissible water level. In addition, an alarm must be generated. The effect of these rules is to ensure that no fault passes unnoticed.
If the water level has dropped below the lowest permissible level, and the resulting alarm has been acknowledged, the level can be restored to normal by pressing the Reset level push-button, holding it depressed for at least 10 seconds after its lamp lights.

Cleaning

The steam generator's need of cleaning is very dependent on the quality of its feed water. In addition to sludge on the bottom and clogging of the level control device, the commonest problem is build-up of lime on the immersion heater and electrodes
The level control device and the lower heater must therefore be removed at the intervals prescribed in the MAINTENANCE chapter, to allow both the components and the vessel to be inspected and, if necessary, cleaned.

NB:
See 'The Steam Generator' in the COMPONENTS chapter for details of removing and refitting the level control device and heater.

Care of steam generator

The operation and safety of the sterilizer depend entirely on care and maintenance of the steam generator. If maintained incorrectly, it can cause problems of varying nature and severity, which are sometimes difficult to link specifically to the steam generator.

Draining / Blowing-off

It is extremely important that the prescribed intervals for draining the water contents of the steam generator are respected. The intervals depend on whether the steam generator is fed with untreated or softened water or whether it is supplied with deionised water.
In the case of both untreated and softened water, the boiler must be drained every week in normal operation. In one week of use, salts, chlorides, phosphates and metals increase around 10 times in the water of the steam generator. Good feed water with a conductivity of 300 µS/cm may have reached 3000 µS/cm in the steam generator by the end of the week.
With deionised water it is sufficient to drain the steam generator every month or every quarter, depending on whether the boiler is equipped with manual or automatic blow-off.
For further information on draining and on the effect of the water quality, see the chapter on MAINTENANCE in this manual and the section on “Feed water to steam generator” in the chapter on INSTALLATION in the OPERATING MANUAL.

Common faults due to omission of draining / blow-off

- Excessively high conductivity in the water causes acute problems in level regulation. This results in the “Steam generator fault” warning and subsequently a risk of boiling dry.
- The accumulation of certain substances produces non-condensable gases in the steam, and the results of sterilization are therefore unreliable.
  A visible sign of gases is that the water level in the inspection glass, on steam boilers which have a water level stand, “swings” up and down when steam is not removed. However, a stationary water surface does not guarantee steam free of gas.
  The method for blowing out the inspection glass is described in the section headed “Every quarter” in the chapter on MAINTENANCE.
- The Bowie-Dick tests can be adversely affected for the same reason.
- The accumulation of chlorides, salts and carbonates produces corrosion on the steam vessel, elements, chambers and sterilized items and breaks down the door seal.
- The accumulation of certain metals and minerals produces coatings in the chamber and on sterilized items.
- If untreated / softened water is used, bottom sludge is formed which builds up on the elements and adversely affects their cooling.

- With untreated water, clogging with limescale and the formation of limescale coatings worsen.

Uppfyllning av vattennivå

Safety requirements do not permit the original level to be reset unnoticed when the water has fallen below the lowest permitted water level. An alarm must therefore be activated. The rules thus prevent a fault passing by unnoticed. The water level is reset automatically.
If the water falls below the lowest permitted level, the equipment can be used normally again after the alarm has been acknowledged.

Cleaning

The need of the steam generator for cleaning depends greatly on the quality of the feed water. As well as sediment and the level device being clogged with sludge, the most common problem is clogging with limescale and coatings on elements and electrodes.
The level device and the lower heating element must therefore be disassembled at the intervals described in the chapter on MAINTENANCE. Inspection and any cleaning can therefore be done on both the components and the vessel.

IMPORTANT!

For removal and refitting of the level device and elements, see “Steam generator” in the chapter on COMPONENTS.

Care of the steam generator

Care and maintenance of the steam generator are decisive for the performance and safety of the sterilizer. Wrongly maintained, it can cause problems of various types and complexity, sometimes difficult to associate with the steam generator.

Emptying/Blowdown

It is extremely important to observe the prescribed emptying intervals for the water content of the steam generator. The length of these intervals depends on whether the steam generator is supplied with untreated or softened water or if it is supplied with de-ionised water.
When using either untreated or softened water, the boiler must be emptied each week during normal operation. During a week's use, concentrations of salts, chlorides, phosphates and metals in the steam generator water rise by about ten times.
When using de-ionised water, it is sufficient to drain the steam generator once a month or even quarterly, depending on whether the boiler is fitted with manual or automatic blow-down.
For more information on draining the boiler, or on the effect of water quality, see the chapter entitled MAINTENANCE in this manual and the section entitled “Feed water for the steam generator” in the INSTALLATION chapter of the INSTRUCTION MANUAL.

Common secondary faults arising from failure to empty or blow down the steam generator

- The build-up of certain substances produces non-condensable gases in the steam, thus influencing the integrity of sterilisation performance.
- For the same reason, the Bowie-Dick tests can be adversely affected.
- Enrichment of chlorides, salts and carbonates causes corrosion of the steam converter, the pipe coil in the converter, the steriliser chamber, sterilised articles, and attacks the door seal.
- A build-up in the concentration of certain metals and minerals results in deposits in the chamber and on sterilised items.
- When untreated/softened water is used, sludge forms on the bottom and reduces heat transfer from the pipe coil.
- The use of untreated water creates lime deposits in the steam generator.

Cleaning

The amount of cleaning needed by the steam converter is heavily dependent on the quality of the feedwater. Apart from sediments and sludge clogging the level device, the most common problem is lime scale and deposits on the pipe coils.
The level device and the pipe coils must therefore be removed at the

intervals specified in the chapter entitled MAINTENANCE. The components and the vessel can then be inspected and cleaned if necessary.

The steam generator's settings and controls

Select the correct type of level control relay

Untreated but softened feed water can cause foaming if the steam generator is heavily loaded. This in turn can interfere with correct operation of the level control relay if this is of the high-sensitivity type, as it senses the foam level and not the water level. For this reason, a lower-sensitivity level control relay should be used when the feed water is untreated or softened raw water, rather than the higher-sensitivity relay that can be used when the feed water has been treated in an ion exchange filter or by reverse osmosis (de-ionised).

Water quality	Type of level control relay	Sensitivity
Raw water / softened water	DNR 2 LS	250 Ω - 5 kΩ 4.000 µS - 200 µS
De-ionised water	DNR 2D	5 kΩ - 100 kΩ 200 µS - 1 µS

Adjusting the level control relay

The steam generator is fitted with two level control relays: one to control the water level and the other to provide boil-dry protection. Their operation is dependent on the conductivity of the water, which means that they need to be adjusted to suit the characteristics of the water. After adjustment, the control must be secured with varnish.

For more information on the principle of the level control, see the section entitled 'The steam generator' in the COMPONENTS chapter.

Basic adjustment

Perform the following adjustments and checks when the steam generator is cold and unpressurised.

- DNR 2 LS:
  Turn the discs to the 70 % position when using untreated, softened water.

- DNR 2D:
  Turn the discs to the 40 % position when using de-ionised water.

Turn off the MCBs supplying power to the boiler heater(s) and allow the feed pump to fill the steam generator. When cold, the steam generator must be filled to a water level 40-50 mm above the Normal Water Level in the sight glass.

If the setting is correct, the pump will then refill the steam generator between essentially the same levels of the sight glass each time, and independently of the amount of steam supplied, in a single operation. Theoretically, the level control system will maintain the level within a range of 15 mm at full operating pressure. A departure of a few mm or below this level can be accepted.

Remember that higher conductivity of the water in the steamgenerator results in poorer level control. See under Emptying.

Adjustment

- If the pump tends to over-fill, turn the disc to a higher sensitivity.
- If the pump does not start to refill the steam generator at the lower level, reduce the sensitivity.

Note that an incorrectly adjusted level control relay can result in the steam generator boiling dry and thus overheating.

PAA015 . . . . . Selection and setting of the level relays new boiler 19 kW

Steam generator settings and checks

Selecting type of level relay

Untreated and softened feed water can cause foaming when the steam generator is heavily loaded. The foaming in turn can lead to a level relay with high sensitivity reacting to the foam level and not to the water level. For this reason, a level relay of lower sensitivity is chosen when the feed water is untreated or softened raw water compared with the level relays used when the water is treated in an ion-exchanger filter or with reverse osmosis (deionised water).

Water quality	Level relay type	Sensitivity
Raw water / softened water	DNR 2 D	5 kΩ - 100 kΩ 200 µS - 10 µS
Deionised water	DNR 2 HS	50 kΩ - 1 MΩ 20 µS - 1 µS

Setting level relays

The steam boiler is equipped with 2 level relays, one of which controls the water level and the other is a boiling-dry protector. The operation of the level relays depends on the conductivity of the water and must therefore be set according to the water quality. After setting, the rotary disc must be locked with locking lacquer. For further information on the principle of level regulation see the section headed “Steam generator” in the chapter on COMPONENTS.

Basic setting

Carry out the settings and checks below with a cold, pressureless steam generator!

- **DNR 2 D:**
  When untreated and softened water is used, set the rotary discs to **Min.**
- **DNR 2 HS:**
  When ionised water is used, set the rotary discs to **40%.**

Drain the steam boiler and let the feed water pump fill the stea boiler. With a risk-free feed water pump it may take 3 - 4 minutes until the contactors in the electrical cabinet switch on. The corresponding time for other pump types is 2 - 3 minutes.

If the setting is correct, the pump fills with water in a continuous period each time regardless of steam removal from the boiler. If the contactors switch off in the case of large removals of steam, the topping-up is not correct at the lower level.

Bear in mind that increased conductivity in the water content of the steam generator results in poorer level regulation. See under Draining.

Adjustment

- If the pump tends to fill to too high a level, the rotary disc must be set to higher sensitivity.
- If the pump starts not to fill at the lower level, the sensitivity must be reduced.

Note that an incorrectly set level relay can cause boiling-dry and therefore overheating.

PAA012 . . . . . Overfill protection, new steam generator

Overfill protection

The steam generator is fitted with a time-controlled overfill protection device that prevents it from being overfilled if the level control relay should fail to interrupt filling at the upper level for any reason.

Basic setting
Set the KT 301 timer relay to 4 minutes.

Safety check

1. Turn off the control power supply and wait until the pressure in the steam generator has fallen to 0.1 bar.
   Open the drain valve slowly and empty the steam generator completely.
2. Temporarily set timer relay to KT 302 to 10 minutes.
3. Restore the control power supply and check that the feed pump starts and then stops after 4 minutes.
4. Restore timer relay KT 302 to 50 seconds.
5. Press the ***Reset Level*** pushbutton and keep it pressed for at least ten seconds after the lamp in the pushbutton lights. The overfill protection has now been reset and the steam generator will be filled to the correct level.

PAA018 . . . . . Overfilling protection new steam boiler

Overfilling protection

Ångalstraren är utrustad med ett tidstyrt överfyllnadsskydd som förhindrar överfyllnad om nivåreläet av någon anledning inte avbryter påfyllningen vid den övre nivån.

Basic setting
The time relay KT302 must be set to 4 minutes.

Safety check

1. Turn off the control current and wait until the pressure in the steam generator has dropped to 0.1 bar.
   Open the drain valve gently and drain the steam generator completely.
2. Set the time relay KT302 temporarily to 2 minutes.
3. Turn on the control current and check that the feed water pump starts and then stops after 2 minutes.
4. Turn off the control current and reset KT302 to 4 minutes.

PAA013 . . . . . Test boil-dry protection New steamgenerator

Boil-dry protection

The purpose of the boil-dry protection is to prevent the steam generator from boiling dry by interrupting the supply to the control circuit, and thus also to the heater in the steam generator. The protection operates as the water drops below the Normal Water Level mark on the steam generator sight glass, at which point there is still a safe level of water above the heater.

Test
A quick test of the boil-dry protection can be performed by pressing the Test level switch pushbutton, interrupting the power supply to the electrodes.

1. With heater power to the steam generator on, press the Test pushbutton and check that the contactors open immediately.
2. Keeping the Test pushbutton pressed, check that the Steam Generator Fault alarm is activated and that the feed pump stops after about 50 seconds.
3. Release the pushbutton and check that the contactors close again.
4. Reset the alarm.

Safety test
This safety test involves simulating a low water level.

1. Wait until the pump starts to refill the steam generator and then turn off the control power supply.
2. Wait for the pressure in the steam generator to fall to 0.1 bar and allow the water to empty out slowly until it can no longer be seen in the sight glass.

3. Open the cover of the contactor enclosure, turn on the control power supply and check that the contactors for the heating element do not operate.

Be prepared immediately to turn off the control power supply if the contactors operate, as this would otherwise cause the heating element quickly to overheat.

4. Check that an alarm is generated efter ca 50 sekunder and acknowledge it.
5. Restart the feed pump and fill the steam generator with water by pressing and holding the Reset Level pushbutton.
6. Check that the contactors do not close until the water level has risen to the Normal Water Level marked on the sight glass. Keep the Reset Level pushbutton pressed for about a further ten seconds after the light in the pushbutton comes on.
7. The pump should now automatically fill the boiler with water to the upper level.
8. During operation, check that the level regulator is working smoothly and regularly.
9. Turn off the control power supply and close the cover of the contactor enclosure.

PAA017 . . . . . Test of boiling-dry protection new boiler 19 kW

Boiling-dry protection

The task of the boiling-dry protection is to prevent boiling-dry by disconnecting the power supply to the control circuit, and thus also to the heating elements of the steam generator. The boiling-dry protection trips at the level NW marked on the side of the steam generator, when there is still a safe level of water over the elements.

Safety check
Water lowering must be simulated in the safety check.

1. Turn off the control current when a topping-up with water starts.
2. Wait until the pressure in the vessel falls to 0.1 bar and allow water to run out gently until the steam generator is completely empty.

3. Open the cover of the contactor casing, turn on the control current and check that the contactors of the heating elements are not operating.

Turn off the control current immediately if the contactors are operating, as the heating elements otherwise rapidly become overheated.

4. Check that an alarm is obtained after approx. 40 seconds and acknowledge it.
5. Check that the contactors do not operate until the vessel is filled with water to the NW level. See also under “Setting of level relay”.
6. The pump must now fill up the remaining water level to the upper level automatically.
7. Check during operation that the level operator is working smoothly and regularly.
8. Turn off the control current and close the cover of the casing.

PAA004 . . . . . Overtemperature protection New steam generator

Overtemperature protection

The steam generator is fitted with a thermal overtemperature protection which, together with the boil-dry protection, provides double safety against overheating. It operates and interrupts the control power supply circuit if the temperature is too high. It will also operate if the capillary tube breaks or if the temperature drops below -10 °C. Once the overtemperature protection has operated, the circuit will remain interrupted until manually reset.

The overtemperature protection can be damaged by too high temperatures, and must therefore always be checked as described below after having operated to prevent a potential accident.

Safety checking

Turn off the power supply to the steam generator using the safety isolator.

- Remove the cover over the heater element terminals and note the positions of the respective temperature sensors.

- Remove the cover of the electrical equipment box and the enclosure of the overtemperature protection.
- Carefully remove the temperature sensor and its capillary tube from its sheath and immerse it in an oil bath at a temperature of 172 °C.
- Check that the switch operates: replace it if defective.
- Refit the sensor in its original sheath.

Note that incorrect positioning of a sensor body can result in failure of protection.

- Prevent the capillary tube from touching any live parts by binding it fast at suitable points.
- Turn on the power supply and check that the water level in the steam generator is correct.
- Check that the heating element contactors have not operated.
- Turn off the power supply on successful completion of the test and reset the overtemperature protection by pressing the Reset push-button.

PAA016 . . . . . Overheating protection new steam generator 19kW

Overheating protection

The steam generator is equipped with overheating protection which together with the boiling-dry protection provides double safety against overheating. The overheating protection is tripped and breaks the control circuit if the temperature is too high. It is also tripped if the capillary tube fails or at -10°C or lower temperature. The overheating protection keeps the circuit broken until it is reset manually.

The overheating protection may be damaged at excessively high temperatures and must therefore always be checked as below after having been tripped in an incident.

Safety check

Turn off the power supply to the steam generator using the safety switch.

- Pay attention to the location of temperature sensors.

- Open the cover on the electrical junction box with the overheating protection.
- Carefully pull the temperature sensor with its accompanying capillary tube out of its immersion tube and lower the sensor into a 172°C oil bath.
- Check that the overheating protection is tripped. Replace defective protection.
- Re-fit the sensor into its immersion tube.

Note that faulty location of a bulb prevents the protection from working.

- Prevent the capillary tube from touching live parts by tying it down at suitable points.
- Turn on the power supply and check that water is topped up to the correct level.
- Check that the contactors of the heating elements do not operate.
- Turn off the power supply after an approved test and reset the overheating protection by pressing the reset button.

PAA005 . . . . . Operating pressure New steam generator

Adjusting the operating pressure

There are two boiler power levels, engaged by a pressure switch a appropriate pressures. The power level responsible for no-load heating and for a modest rate of steam supply is controlled by the contact shown in the circuit diagram as having the higher pressure. When the boiler is called upon to supply full output, this heat input is not sufficient to prevent the pressure from dropping to a level at which the higher heating power is connected.

Adjustment

- Adjust the contact that controls the higher switching pressure for ***Power Off*** at the pressure indicated on the electrical circuit diagram.
- Adjust the other contact for **Power On** at the pressure shown on the circuit diagram.

See also further details of the pressure switch in the section entitled “The Steam Generator” in the COMPONENTS chapter.

PAA009 . . . . . Steam converter operating pressure

Setting the operating pressure

Using the setting screw on the reducing valve, adjust the primary steam pressure so that the operating pressure (= secondary pressure) is 2.8 bar(e).

See also the reducing valve in the chapter entitled COMPONENTS.

PAA006 . . . . . Safety press. switch New steam generator

Adjusting the safety pressure switch

The steam generator is fitted with a manually resettable pressure switch which interrupts the power supply to the control circuit when the steam pressure is 0.5 bar(g) below the design pressure of the vessel. The main purpose of this switch is to interrupt the power supply to the boiler in the event of an uncontrolled pressure rise, thus avoiding operation of the safety valve. See also further details of the safety pressure switch in the COMPONENTS chapter.

Adjustment

1. Remove the adjusting screw from the conical adjusting screw cover.
2. Apply a spanner to the adjustment screw flats and set the scale to the disconnection pressure shown in the electrical circuit diagram.
3. Perform a safety check in normal operation.
4. Refit the adjustment screw cover and tighten its screw.

Safety check

The pressure in the steam generator can be raised independently of the control system using the *Test pressure limiter* key-operated switch until the safety pressure switch operates.

1. Turn the ***Test pressure*** limiter key-operated switch to the Test (●) position, thus applying maximum power to the steam generator heater, not under control of the control system. (This switch is fitted to the outside of the electrical terminal box.) Watch the pressure rise on the **Steam supply** pressure gauge.
2. Check that the safety switch operates and extinguishes the *Reset level* indicating lamp at the pressure indicated on the electrical circuit diagram.

Turn the key-operated switch off immediately if the pressure switch does not operate at the intended pressure

3. Reset the pressure switch to its operating mode on conclusion of the test by pressing the push-button on its left-hand side.

Feed water supply

The steam generator is supplied with water from a tank via the feed water pump, a filter, a restriction with a vent connection, check valve and a shut-off valve. It is important for system safety that the water supply rate is sufficient to meet maximum steam production rate.

Safety check:
Method A:

1. Allow the steam generator operating pressure to reach its upper value (see the circuit diagram) and open the drain valve slightly. Cool the drain pipe to reduce steam and noise.

Remember the risk of scalding or excessive noise from discharged steam.

2. Knowing that the distance between the holes is equivalent to a water volume of 0.5 l in the tank, use the feed water tank lid as a measure.
3. Fill the tank to the upper hole.
4. Maintain maximum operating pressure in the steam generator using the key-operated ***Test pressure limiter*** switch and wait for the pump to start to refill the steam generator. Be ready to measure the time.
5. Carefully keeping the float valve in its closed position, use a stopwatch to measure the time for the water level to drop by an amount equivalent to one litre.
   NB: The water level must drop in the tank as a whole. If the tank is divided, it may be necessary to remove the divider in order to ensure this.
6. Calculate the capacity of the feed water tank from the formula given below. The capacity must exceed the value given in the technical data for the steam generator in the COMPONENTS chapter.
   (measured volume in litres / measured time in seconds) x 60 = litre/min.
7. Return all the settings etc. to their normal operating states.

Method B:
In certain models, measurement as described above can be difficult due to the position of the tank. In such cases, the following (somewhat less accurate) method can be employed.

- Perform steps 1 and 4 as described above.
- Measure the time for which the pump runs in order to fill the steam generator to its maximum water level. Repeat this measurement three to five times and ignore any values that differ greatly from the others.
- Check that the time required to refill the water does not exceed that given in the technical data.

Times that are too long can be caused by the following faults, which must be corrected:

- A blocked feed water pipe (by lime) or components fitted in it, e.g. chokes etc.
- A worn feed water pump.
- A blocked level control device (by lime) or container.
- A defective check valve or solenoid valve in the feed water connection.

Feed water supply

The steam generator is supplied with water from a tank via the feed water pump, a filter, a restriction with a vent connection, check valve and a shut-off valve. It is important that the water supply rate is sufficient to meet maximum steam production rate.

Check:
Method A:

1. Open the drain valve slightly. Cool the drain pipe to reduce steam and noise.

Remember the risk of scalding or excessive noise from discharged steam.

2. Knowing that the distance between the holes is equivalent to a water volume of 0.5 l in the tank, use the feed water tank lid as a measure.
3. Fill the tank to the upper hole.
4. Carefully keeping the float valve in its closed position, use a stopwatch to measure the time for the water level to drop by an amount equivalent to one litre.
   NB: The water level must drop in the tank as a whole. If the tank is divided, it may be necessary to remove the divider in order to ensure this.

5. Calculate the capacity of the feed water tank from the formula given below. The capacity must exceed the value given in the technical data for the steam generator in the COMPONENTS chapter.
   (measured volume in litres / measured time in seconds) x 60 = litre/min.
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- Check that the time required to refill the water does not exceed that given in the technical data.

Times that are too long can be caused by the following faults, which must be corrected:

- A blocked feed water pipe (by lime) or components fitted in it, e.g. chokes etc.
- A worn feed water pump.
- A blocked level control device (by lime).
- A defective check valve or solenoid valve in the feed water connection.

User-programmable functions

Barring codes

In the control system there are four different types of code, permitting four different types of action. The purpose of these codes is to prevent people who do not have sufficient knowledge or authority from accessing, intentionally or accidentally, actions whose consequences they cannot foresee.

It is important that these codes are communicated only to people who need them in their work and who have the necessary expertise / authority.

1. Password
This code prevent the starting of programs that are intended as test programs, emergency programs or programs for the sterilization of liquids. It is a common feature of these programs that they need not be validated for routine sterilization.

On some sterilizers the password also prevents the door being opened after an incorrect process.

The system allows several passwords to be stored, each linked to an identification (id) code. The id code is printed out on a printer, if there is one.

2. Parameter password
This password prevents unintentional alteration of adjustable parameters. Adjustable parameters and the ranges within which they can be set are evident from the program combination. The program combination also shows which values are stored in the control system EPROM on delivery.

3. Service password
This password prevents access to menus offering settings and tests that require an authorised technician.

4. Programming password
This password prevents access to the menus that can be used to change the sequence program. The programming password is used only in exceptional cases by users, since this level of authorisation calls for very detailed knowledge of the control system programming and the design and operation of the sterilizer.

On delivery, the sterilizer control system has four different passwords. These are described in a separate document in a sealed enveloped. The passwords can be altered by the used. A brief description of the procedure for this included with the sealed document.

PAX021 . . . . . Changing parameters with OP2. Hosp. div.

Changing parameters with OP2

The parameters that may need to be changed when programming at the user are listed in the program combination. As well as sterilizing temperature and time it is possible to adapt the post-treatment of the processes to reach maximum dryness of gods that are difficult to dry.

Three different post-treatments can be combined to achieve the best results:

- Post-vacuum
- After-pulses of superheated steam
- After-pulses of sterile air

The required post-treatment is activated by programming in the required time. If the parameter time is set to zero, this means that the post-treatment in question is omitted from the process.

See also the sections about menus 0400E and 0500E under (”Control system PACS 2000”. Suitable settings for different types of goods are described in the guide “Sterilization with steam”.

PAX051 . . . . . Changing the program description parameters General

Changing the program description parameters

The parameters that would be of most interest in changing in connection with programming by the user are listed in the programming combination. As well as sterilizing temperature and time it is possible to adapt the post-treatment of the processes to reach maximum dryness of gods that are difficult to dry.

Three different post-treatments can be combined to achieve the bes results:

- Post-vacuum
- After-pulses of superheated steam
- After-pulses of sterile air

The required post-treatment is activated by programming in the required time. If the parameter time is set to zero, this means that the post-treatment in question is omitted from the process.
See also the section on setting the parameter values in the PACS 2000 CONTROL UNIT chapter. Suitable settings for different types of goods are described in the guide “STERILIZATION WITH STEAM”.

PAM006. . . . . Amending program parameters GEF-449 program F2901

Modification of parameters in program description

The parameters which are modifiable for programming by the user are shown by the program combination. An indication is also given there of the interval within which the parameter concerned can be set.

See also the section on the setting of parameter values in the chapter on CONTROL UNIT PACS 2000.

PAX052 . . . . . Changing programs in connection with validation

Changing programs in connection with validation

The sterilizer has been type-tested by the manufacturer, using reference loads as prescribed in the EN 285 sterilizer standard. These reference loads are regarded as requiring the sterilizer performance necessary in

order to ensure sterilisation of varying types of loads as encountered in day-to-day use in medical care.
However, in order to ensure correct performance, EN 554 prescribes that the user must validate the sterilizer using typical loads equivalent to those that will subsequently be sterilised in the sterilizer.
Normally, the sterilizer will meet this validation requirement without requiring any adjustments. If it does not do so, this may be due to the fact that the user's typical loads require performance that differs from that specified in EN 285.

The sterilizer is capable of being reconfigured to deal with such a situation and, within certain limits, can be modified at site. Generally reconfiguration requires a change to the pre-treatment stage of the sterilisation process. This requires a thorough understanding and knowledge of the importance of the pre-treatment stage for sterilisation results, together with programming training in order to perform the necessary reconfiguration.

NB: Always contact Getinge when reconfiguring the pre-treatment stage in order to ensure effective sterilisation.

PAM007 . . . . . Modification of program parameters in validation of GEF-449 program F2901

Modification of program in validation

These reference loads are regarded as requiring the sterilizer performance needed to ensure the sterilization of temperature-sensitive items in daily use in medical care.
However, to ensure function standard EN 554 specifies that the user validates the sterilizer with type loads corresponding to what is then to be sterilized in the sterilizer.
The sterilizer is normally to meet the validation requirements without adjustments. If it does not do so, this may be due to the user's type loads requiring different performance than the reference loads which have been tested.

The sterilizer is prepared for such a situation and can be adapted in situ within certain limits. Great understanding and knowledge of the significance of the process for the sterilization result and training in programming are required to carry out an adaptation of this kind.

Note: Always contact Getinge in the case of an adjustment of the process to ensure sterilization capability

Automatic loading

The sterilizer has an automatic loader which makes it possible to select one or more programs so that the goods can be loaded in and the program started automatically. To make this change it is essential to have access to the programming code.

Operator panel OP2

- Choose program.
- Go to menu 6500E.
- Find the parameter “Cont. loading”
- Change the parameter value to 1.
- Exit from the menu.

Operator panel OP3, FPC, OPC/OPH

- Go to the “Programming” menu.
- Choose a program in the “Edit PACS program” menu.
- Choose “Edit parameter list” in the “Program editing” menu.
- Choose STANDBY phase in the “Choose program phase” menu.
- Highlight the parameter “Cont. loading”
- Change the parameter value to 1.
- Confirm and exit from the menu with F10.

The program is now set so that automatic loading is possible. Setting-up of automatic loading is described in detail under “Operating instructions”.

Automatic loading

The sterilizer has an automatic loader which makes it possible to select one or more programs so that the goods can be loaded in and the program started automatically. To make this change it is essential to have access to the programming code.

Operator panel OP2

- Choose program.
- Go to menu 6500E.
- Find the parameter “Cont. loading”

- Change the parameter value to 1.
- Exit from the menu.

Operator panel OP3, FPC, OPC / OPH

NB: Only personnel who have been trained to program the PACS 2000 may perform the following changes. Incorrect programming in the menus can result in changes to the basic program that give rise to a risk of physical injury.

- Go to the “System programming” menu.
- Go to the “Programming” menu.
- Choose a program in the “Edit PACS program” menu.
- Choose “Edit parameter list” in the “Program editing” menu.
- Choose STANDBY phase in the “Choose program phase” menu.
- Highlight the parameter “Cont. loading”
- Change the parameter value to 1.
- Confirm and exit from the menu with F10.

The program is now set so that automatic loading is possible. Setting-up of automatic loading is described in detail under OPERATING INSTRUCTIONS.

PAX054 . . . . . Door function aut.door hospital div.

Changing the door function

On completion of a sterilisation process, the discharge door of sterilizers having two doors is opened automatically. After processes intended only for testing or maintenance, the loading door is not normally opened until the door push-button is pressed.
By changing a parameter value, it is possible to change the door function individually for each program. To do this requires access to the programming code.

Parameter values
0 = Discharge door opens automatically on successful completion of process.

1 = Discharge door does not open until the door push-button is pressed.

2 = The discharge door does not open. The loading door opens when the door push-button is pressed.

Program these parameters as follows:

Operator panel OP2

- Select the program.
- Go to menu 6500E.
- Find the “Door function” parameter.
- Change the parameter value to the required value.
- Exit from the menu.

Operator's panelOP3, FPC, OPC / OPH

NB: Only personnel who have been trained to program the PACS 2000 may perform the following changes. Incorrect programming in the menus can result in changes to the basic program that give rise to an immediate risk of physical injury.

- Go to the “System programming” menu.
- Go to the “Programming” menu.
- Choose a program in the “Edit PACS program” menu.
- Choose “Edit parameter list” in the “Program editing” menu.
- Choose the PROCESS CONCLUDED phase in the “Choose program phase” menu.
- Highlight the “Door function” parameter.
- Change the parameter value to the required value.
- Confirm and exit from the menu with F10.

PAX022 . . . . . Maintenance alarm.

Maintenance codes

With an OP3, OPC or OPH, maintenance codes can be programmed in so that the sterilizer itself keeps track of and notifies when maintenance is required. A certain number of codes are programmed on delivery. These trigger a “MAINTENANCE” message after set intervals in accordance with the recommendations under “Maintenance”.

The programmed-in service codes also include validation, but inactivated (service interval = 0). To activate the code, set the validation interval required by the relevant quality assurance system.

PAX055 . . . . . Maintenance codes. Hospital division

Maintenance codes

With an OP3, FPC, OPC or OPH, maintenance codes can be programmed in so that the sterilizer itself keeps track of and notifies when maintenance is required. A certain number of codes are programmed on delivery. These trigger a “MAINTENANCE” message after set intervals in accordance with the recommendations under MAINTENANCE.

The programmed-in service codes also include validation, but inactivated (service interval = 0). To activate the code, set the validation interval required by the relevant quality assurance system.
See also “Service indicators” in the MAINTENANCE chapter.

PAX023 . . . . . Calendar

Date and time

This service code gives access to the part of the menu where date and time can be changed. See the section about menu 2000 and underlying menus under “Control system PACS 2000”.

PAX056 . . . . . Date and time OP2, OP3, FPC, OPC, OPH

Date and time

This service code provides access to the part of the menu where the date and time can be changed. See the section on the date/time menu in the PACS 2000 CONTROL UNIT chapter.

PAX024 . . . . . Calibration.

Calibration

Analog sensors/transducers must be calibrated, for example when replaced. The calibration menu can be accessed by using the service code. See the section about menu 3000 and the underlying menus in “Control system PACS 2000”

When using an oil bath, note the following points:

A Accuracy must meet the requirements of EN285

B Compounds or condensation in the oil may cause coatings and thus severely reduced the accuracy of measurement. Change the oil at regular intervals!

C Use an oil bath with a large capacity, preferably more than five litres.

D Allow the measuring instrument to stabilize for one to two hours after the bath has reached the set temperature.

E Allow the oil bath to stabilize for at least 30 minutes after the sensors are lowered into the bath and the bath has regained its set temperature.

F Clean the sensors thoroughly to remove the oil after calibration.

PAX057 . . . . . Calibration OP2, OP3, FPC, OPC, OPH

Calibration

Analog sensors/transducers must be calibrated, for example when replaced. The calibration menu can be accessed by using the service code. Se the calibration menus section in the PACS 2000 CONTROL UNIT chapter

When using an oil bath, note the following points:

A Accuracy must meet the requirements of EN285

B Compounds or condensation in the oil may cause coatings and thus severely reduced the accuracy of measurement. Change the oil at regular intervals!

C Use an oil bath with a large capacity, preferably more than five litres.

D Allow the measuring instrument to stabilize for one to two hours after the bath has reached the set temperature.

E Allow the oil bath to stabilize for at least 30 minutes after the sensors are lowered into the bath and the bath has regained its set temperature.

F Clean the sensors thoroughly to remove the oil after calibration.

NB: If the EPROM in the control unit is to be used to restore the software by means of a cold start, after the sterilizer has been brought to a safe state, all changes and calibrations performed after delivery will be erased.

PAX025 . . . . . Setting the sterilizer No.

Setting the sterilizer number

The sterilizer number identifies a particular sterilizer. The number is used in communication between OPH and one or more OP2s / OP3s. The number, which must be in the range 1-99, also serves as an identification on printed listings of process data and thus makes the lists trace-

able.
See the section about menu 6200E under “Control system PACS 2000”.

PAX058 . . . . . Setting the sterilizer number OP2,OP3,FPC,OPC,OPH.

Setting the sterilizer number

The sterilizer number identifies a particular sterilizer. The number is used in communication between OPH and one or more FPCs / OP2s / OP3s. The number, which must be in the range 1-99, also serves as an identification on printed listings of process data and thus makes the lists traceable.
Perform this programming as follows:

Operator panel OP2

- Go to the 6200E menu.
- Enter the sterilizer number in accordance with the instructions for this menu as given in the PACS 2000 CONTROL UNIT chapter.
- Exit from the menu.

Operator's panel OP3, FPC, OPC / OPH

NB: Only personnel who have been trained to program the PACS 2000 may perform the following changes. Incorrect programming in the menus can result in changes to the basic program that give rise to an immediate risk of physical injury.

- Go to the “System programming” menu.
- Select the “System definition” menu.
- Select the “System configuration” menu.
- Highlight the sterilizer number field.
- Enter the required sterilizer number.
- Confirm and exit from the menu with F10.

PAX026 . . . . . Log interval

Log interval for process data

The log interval can be changed so that more or less measurement data is printed out. Logging during the sterile phase is controlled by the parameter “Short interval”, whilst printout of data during the remaining parts of the process is controlled by the value “Long interval”. On delivery, both these values are set to 59 min. 59 sec. Usually this setting only

gives printout of data when the sub-process changes.
See “Printer” under “Operation” and the description of menus 4200E and 4300 E under “Control system PACS 2000”.

PAX059 . . . . . . Log interval OP2,FPC,OPC,OPH

Log interval for process data

The log interval can be changed so that more or less measurement data is printed out. Logging during the sterile phase is controlled by the parameter “Short interval”, whilst printout of data during the remaining parts of the process is controlled by the value “Long interval”. On delivery, both these values are set to 59 min. 59 sec. Usually this setting only gives printout of data when the sub-process changes.
See also the “Printer” section in the OPERATION chapter of the INSTRUCTION MANUAL or, if the equipment includes Supervisor, the “Documentation of the process” section in the PROCESS chapter.

Perform this programming as follows:

Operator's panel OP2

- Go to the 4200E menu.
- Set the required long logging interval in accordance with the instructions for this menu in the PACS 2000 CONTROL UNIT chapter.
- Go to menu 4300E.
- Set the required short logging interval.
- Exit from the menu.

Operator's panel OP3, FPC, OPC / OPH

NB: Only personnel who have been trained to program the PACS 2000 may perform the following changes. Incorrect programming in the menus can result in changes to the basic program that give rise to an immediate risk of physical injury.

- Go to the “System programming” menu.
- Select the “System definition” menu.
- Select the “Printer logging definition” menu.
- Highlight the logging interval field.
- Set the required logging interval.
- Confirm and exit from the menu with F10.

PAX027 . . . . . Adaptation to high water temp. and low water pressure

Adaptation of the sterilizer to high water temperature and low water pressure.

If necessary the sterilizer can be given a “tropical setting” by inserting a cable bridge between terminals 1111 and 1112. This adapts the control system to handle water temperature up to 35 °C and water pressure down to 10 m WG.

Note: The sterilizer must be re-validated after this change.

PAX060 . . . . . Adaptation to high water temp and low water press.

Adaptation of the sterilizer to high water temperature and low water pressure.

If necessary the sterilizer can be given a “tropical setting” by inserting a cable bridge between terminals 1111 and 1112 This modifies the control system to handle water temperatures up to 35oC and water pressures down to 10 mSwg.
The effect of this is to augment the cooling, while restricting the first part of the post-treatment stage. This restricts the temperature of the discharge water to about 90 °C for the first four minutes, after which the temperature drops.,

Note: The sterilizer must be re-validated after this change.

PAX030 . . . . . Adaptation to high water temp.

Adaptation of the sterilizer to high water temperature

The depth of the vacuum phases in the processes can be reduced from 70 mbar (a) to 130 mbar (a) by inserting a cable bridge between terminals 1111 and 1112. This adapts the control system to handle water temperatures above 20 °C. This adaptation can also be used to shorten the process time by about 15 minutes.

Note: The sterilizer must be re-validated after this change.

PAX061 . . . . . Vacuum down to 70mbar(a).

Increasing the vacuum

The depth of the vacuum phases in the steam processes can be changed from 100 mbar(a) + 30 seconds extra vacuum suction to 70 mbar(a) by removing a wire link between two of the terminals in the electrical terminal box. The terminals from which the wire link is to be removed can be identified in the electrical circuit diagram.
This modifies the control system to increase the vacuum to 70 mbar(a) during all vacuum phases.
This modification should be applied only in exceptional cases, when it is necessary further to improve air extraction. It increases the process time by about 15 minutes.

Note: The sterilizer must be re-validated after this change.

PAX062 . . . . . Vacuum Formaldehyde program

Modification of formalin processes to high water temperatures

The formalin process normally works with high vacuum, as it is more difficult to remove air than during steam processes. If water temperatures are regularly above 20 °C, the vacuum pump gradually becomes incapable of achieving the low pressures that were originally intended.

1. If high water temperatures are making it difficult for the vacuum pump to achieve the necessary vacuum, the vacuum setting can be increased by changing a parameter value.
   To make this change requires access to the programming code.
   Perform this programming as follows:

Operator's panel, OP2

- Select the program.
- Go to menu 6500E.
- Find the vacuum depth parameter.
- Change the parameter value to a maximum of 100 mbar(a).
- Exit from the menu.

Note: The sterilizer must be re-validated after this change.

2. In order further to improve vacuum suction performance, the supply of sealing water to the vacuum pump can be increased. See the ECO section on the water conservation system in the MAINTENANCE chapter.
   - Remove the choke washer (1) from the water tank and drill out the hole to a diameter of 4 mm.
   - Refit the choke washer and compensate for the increased flow from the tank by closing ball valve (2) completely.
   - Test the operation of the sterilizer with high vacuum. Check whether the vacuum can be further improved by slightly opening ball valve (2).
3. The third measure is intended to improve the cooling performance of the plate heat exchanger at low pressure.
   - Remove the choke washer, fitted to the horizontal heat exchanger for the circulating seal water for the vacuum pump. It is fitted to the cooling water inlet, in the form of a washer.
   - Replace the seals and reassemble.

The cooling water valve should be completely cleaned in connecti with removal of the choke washer. This cleaning is described in the COMPONENTS chapter in the section entitled “Flat plate heat exchanger”, under the “Flow control” subheading.

Note that the flow details for minimum cooling in the above-mentioned sections, as well as for the ECO system in the MAINTENANCE chapter, no longer apply.

Modification of steam processes to suit high water temperatures

The modifications described in Items 2 and 3 above also improve the sterilizer's ability to accept high water temperatures during the steam processes.
Further modifications can be made if it is found after test operation that the measures have not been sufficient, i.e. if the sterilizer does not reach a vacuum of 100 mbar(a) within a reasonable time, or if the temperature of the discharged cooling water approaches its boiling point during post-treatment.

If necessary, the sterilizer can be modified to a tropical version by fitting a wire link between terminals number 1111 and 1112. This modifies the control system so that it can handle water temperatures up to 35 °C and water pressures down to 10 mWG.

This works by raising the vacuum limit to 130 mbar(a) and restricting the first part of the post-treatment phase.

Note: The sterilizer must be revalidated after this change.

PAM008. . . . . Vacuum suction GEF-449 program B2501, B2502

Adaptation of formalin processes to high water temperatures

The formalin process operates normally with deep vacuum suctions as it is more difficult to bring about the expulsion of air than in steam processes. With a regular water temperature above 20°C, the vacuum pump gradually becomes incapable of reaching the low pressures intended from the outset..

1. If high temperatures make it difficult for the vacuum pump to get down to a desirable vacuum depth, this can be increased by a parameter value.
   To make the change, it is necessary to have access to the programming code.
   The programming proceeds as follows:

Operator panel OP2

- Select program
- Go to menu 6500E
- Find the parameter "Vacuum depth"
- Change the parameter value to no higher than 100 mbar(a)
- Exit the menu.

Note: The change requires the sterilizer to be re-validated

Adapting steam processes to high water temperatures

The sterilizer can be provided if necessary with a "tropical setting" by inserting a cable bridge between terminal numbers 1111 and 1112. As a result of this action the control system is adapted to handle water temperatures up to 35°C and water pressure down to 10 m water column.

The adaptation is made by raising the vacuum limit to 130 mbar(a) and constricting the first part of the post-treatment.

Note: The modification requires the sterilizer to be re-validated!

PAM009 . . . . . Vacuum suction GEF-449 program F2901

Adaptation of formalin processes to high water temperatures

The formalin process operates normally with deep vacuum suctions as it is more difficult to bring about the expulsion of air than in steam processes. With a regular water temperature above 20°C, the vacuum pump gradually becomes incapable of reaching the low pressures intended from the outset.

1. If high temperatures make it difficult for the vacuum pump to get down to a desirable vacuum depth, this can be increased by a parameter value.
   To make the change, it is necessary to have access to the programming code.
   The programming proceeds as follows:

Bedienungstafel OP2

- Select program
- Go to menu 6500E
- Look for the parameter "Vacuum depth"
- Change the parameter value to no higher than 100 mbar(a)
- Exit the menu.

Note: The change requires the sterilizer to be re-validated!

OPERATING INSTRUCTION

This operating instruction is intended for the daily use of the sterilizer.

One copy, together with one copy of the program combination, is at delivery to be found inside the sterilizer chamber.
These two documents are to be available for the operator when working at the control panel.

QAX059 . . . . . .Operating instruction GEE

Jacket heating

Due to the long heating up time, the sterilizer jacket heating system should be kept in operation continuously.

- Keep the sterilizer door closed when the activities permit.

Preoperation checks

- Check that the ventilation system is operating.
- Check that valves for cold water, gas, steam, compressed air and when appropriate nitrogen are open.
- Check that the recorder paper content is sufficient for the approaching sterilizing process.

Sterilizing

- Push the button *Open door* and lock the door in open position with the *Safety key* beside the door.
- Mount a new moisture sensor if any, prior to each process.
- Load the sterilizer, place temperature sensors if any in the load and reset the *Safety key*.
- Close the door by pushing *Close door*.
- Check on the indicator that opposite door is closed.
- Push the desired program button.
- Set operator adjustable parameters when required.
- Start the process by pushing button *Start* (with OPC key *F8)*. The indicator *In Progress* indicates that the process proceeds automatically.
- On completion of a satisfactory process the indicator *Process complete* illuminates. If time permits, leave the load for degasing in the closed sterilizer.
- Open the door for unloading by pushing button *Open door*.

Do not touch the load with bare hands.

- An open door is closed by pushing button *Close door*

Close down

Unless otherwise prescribed by local rules:

- Shut the chamber door.
- Shut off supplies for cold water, gas, steam, compressed air and when appropriate nitrogen.
- As necessary, clean and dry the sterilizer chamber internally, using a chlorine free cleaner.

Working with gas bottles

Always wear protective clothing, rubber gloves and fresh-air mask when working with the gas bottles.

QAX094 . . . . . .Moisture meter. Fill water E QAX059

- Top up the moisture meter water tank with deionized water.

QAX052 . . . . . .GE-program

This sterilizer must not be used for processing other material than stated in the program combination list.

Pathogenic material must not be sterilized in this sterilizer.

QAX063 . . . . . .GE-program risk-sterilizer

This sterilizer must not be used for processing other material than stated in the program combination list.

QAX062 . . . . . .Beware of hot surfaces. General Ph.div.

Beware of hot surfaces inside the sterilizer chamber when door is open!

Use

This sterilizer must not be used to sterilize materials other than those stated in the list of available programs (PROGRAM COMBINATION).
Failure to comply with this rule could be dangerous.

Pathogenic material must not be sterilized in this sterilizer.

Daily preparations

Keep the doors of the sterilizer closed as much as possible to avoid energy losses and unwanted heating of the room.

- Learn the functions of the control buttons and indicator lamps by studying the chapter about control system PACS 2000. Find out how the user-programmable parameters are set on this sterilizer.
- Open the valves for cold water and, where applicable, steam.
- Close the main switch of the control system.
- Fit the chart recorder with a new chart or check that there is enough paper in the printer.
- Run the day's first steam sterilization process with the chamber empty. This heats up and drains the system piping. This operation can be combined with a leak test if the sterilizer is not fitted with a cold leak test program.

Use

This sterilizer must not be used to treat materials other than those indicated in the list of available programs (PROGRAM COMBINATION).
Any other use may entail danger.

Pathogenic material must not be sterilized in this sterilizer!

Daily preparations

As far as possible, keep the sterilizer doors closed to reduce energy losses and unwanted heating of the room.

- Learn the function of the control buttons and signal lamps by studying the chapter on the PACS 2000 control unit. Find out how the parameters programmable by the user have been set on this sterilizer.
- Open valves for cold water, air and, where appropriate, steam.
- Turn on the sterilizer mains switch.
- If the sterilizer is provided with a recorder, check that it contains sufficient paper.

Use

This sterilizer must not be used to sterilize materials other than those stated in the list of available programs (PROGRAM COMBINATION).
Failure to comply with this rule could be dangerous.

Pathogenic material must not be sterilized in this sterilizer.

Daily preparations

Keep the doors of the sterilizer closed as much as possible to avoid energy losses and unwanted heating of the room.

- Learn the functions of the control buttons and indicator lamps by studying the chapter about control system PACS 2000. Find out how the user-programmable parameters are set on this sterilizer.
- Open the valves for cold water and, where applicable, steam.
- Close the main switch of the control system.
- Fit the chart recorder with a new chart or check that there is enough paper in the printer.

Password-protected programs

Programs that are not intended to be used routinely are protected with a password. Some degree of consideration is called for before a password-protected programs is chosen. Examples include test programs, programs for emergency situations or programs with selectable parameters.

Starting a protected program:

A Select the program and choose “Start”

- The display shows the password entry menu.
- Press ENTER. Key in the password with the arrow keys and press ENTER again.

Running programs

- Run the first process of the day with the chamber empty. Alternatively, perform a leakage test.
- Press the button for the required program. The lamp in the button lights up.
- Load the sterilizer.
- Check that the “Steam supply” pressure gauge reads at least 250 kPa.
- Close the door by lifting the door handle **with both hands**.
- Press the “Start” button. The progress of the process can be followed on the display.
- The “Process complete” lamp lights up when the process has been completed without faults. When the door gasket released, open the door on the unloading side. The “Process complete” lamp goes out.
- Immediately choose another program, unless the same program is to be used again for the next run.

QAM011 . . . . . .Sterilizer with program for liquids. Hospital division.

Use

This sterilizer must not be used to sterilize materials other than those stated in the list of available programs (PROGRAM COMBINATION).
Failure to comply with this rule could be dangerous.

Pathogenic material must not be sterilized in this sterilizer.

Daily preparations

Keep the doors of the sterilizer closed as much as possible to avoid energy losses and unwanted heating of the room.

- Learn the functions of the control buttons and indicator lamps by studying the chapter about control system PACS 2000. Find out how the user-programmable parameters are set on this sterilizer.
- Open the valves for cold water and, where applicable, steam.
- Close the main switch of the control system.

- Fit the chart recorder with a new chart or check that there is enough paper in the printer.

Password-protected programs

Programs that are not intended to be used routinely are protected with a password. Some degree of consideration is called for before a password-protected programs is chosen. Examples include test programs, programs for emergency situations or programs with selectable parameters.

Starting a protected program:

A Select the program and choose “Start”

B The display shows the password entry menu.

C Press ENTER. Key in the password with the arrow keys and press ENTER again.

Parameter password

Before a selectable parameter can be changed, a parameter password must be entered, after which all parameters (see Program combination) can be changed.

Running programs

- Run the first process of the day with the chamber empty. Alternatively, perform a leakage test.
- Press the button for the required program. The lamp in the button lights up.
- Load the sterilizer.
- When liquids are to be sterilized, place a temperature transducer in the load.
- Check that the “Steam supply” pressure gauge reads at least 250 kPa.
- Close the door by lifting the door handle **with both hands**.
- Press the “Start” button. The progress of the process can be followed on the display.
- The “Process complete” lamp lights up when the process has been completed without faults. When the door gasket released, open the door on the unloading side. The “Process complete” lamp goes out.
- Immediately choose another program, unless the same program is to be used again for the next run.

Use

This sterilizer must not be used to sterilize materials other than those stated in the list of available programs (PROGRAM COMBINATION).
Failure to comply with this rule could be dangerous.

Pathogenic material must not be sterilized in this sterilizer.

Daily preparations

Keep the doors of the sterilizer closed as much as possible to avoid energy losses and unwanted heating of the room.

- Learn the functions of the control buttons and indicator lamps by studying the chapter about control system PACS 2000. Find out how the user-programmable parameters are set on this sterilizer.
- Open the valves for cold water and, where applicable, steam.
- Close the main switch of the control system.
- Fit the chart recorder with a new chart or check that there is enough paper in the printer.

Password-protected programs

Programs that are not intended to be used routinely are protected with a password. Some degree of consideration is called for before a password-protected programs is chosen. Examples include test programs, programs for emergency situations or programs with selectable parameters.

Starting a protected program:

A Select the program and choose “Start”

B The display shows the password entry menu.

C Press ENTER. Key in the password with the arrow keys and press ENTER again.

Parameter password

Before a selectable parameter can be changed, a parameter password must be entered, after which all parameters (see Program combination) can be changed.

Running programs

- Run the first process of the day with the chamber empty. Alternatively, perform a leakage test.
- Press the button for the required program. The lamp in the button lights up.
- Load the sterilizer.
- When liquids are to be sterilized, place a temperature transducer in the load.

There is a risk of explosive boiling-over or even of flasks bursting if the load sensor is not placed in the load when liquids are to be sterilized.

- Check that the “Steam supply” pressure gauge reads at least 250 kPa.
- Close the door by lifting the door handle **with both hands**.
- Press the “Start” button. The progress of the process can be followed on the display.
- The “Process complete” lamp lights up when the process has been completed without faults. When the door gasket released, open the door on the unloading side. The “Process complete” lamp goes out.
- Immediately choose another program, unless the same program is to be used again for the next run.

QAX072 . . . . . .Sterilizer with programs for formaldehyde sterilization.

Use

This sterilizer must not be used to sterilize materials other than those stated in the list of available programs (PROGRAM COMBINATION).
Failure to comply with this rule could be dangerous.

Pathogenic material must not be sterilized in this sterilizer.

Formaldehyde is a toxic matter. See also General advice for formaldehyde sterilizers in chapter OPERATION.

Daily preparations

Keep the doors of the sterilizer closed as much as possible to avoid energy losses and unwanted heating of the room.

- Learn the functions of the control buttons and indicator lamps by studying the chapter about control system PACS 2000.
- Open the valves for cold water, compressed air and, where applicable, steam.
- Turn on main power to the control system.
- Fit the chart recorder with a new chart or check that there is enough paper in the printer.

QAX037 . . . . . .General

Preoperation checks

QAX038 . . . . . .E-version

- Check that valves for cold water and compressed air are open.

QAX039 . . . . . .A-version

- Check that valves for cold water, compressed air and steam are open.

QAX070 . . . . . .General

- Switch on the power switch.

QAX064 . . . . . .GED Formaldehyde process

NOTE! Prepare as follows if a formaldehyde program is to be used.

Formaldehyde is a toxic matter. See also General advice for formaldehyde sterilizers in chapter OPERATION.

- Start if possible with a cold sterilizer.
- Select a formaldehyde program and wait for the sterilizer to heat up to appropriate sterilization temperature (about 45 m).
- Keep the sterilizer doors closed if staring with a cold sterilizer. Leave door open if sterilizer temperature exceeds sterilization temperature.
- Push an 1000 ml infusion bottle type DIN 58 363, (DIN Leicht) filled with formaldehyde as specified below, into the flask holder.

Sterilizer type:	GED 7 12 22	GED 11 12 26
34 - 38% formaldehyde:	900 ml	2 x 900ml

QAX067 . . . . . .GE449 Formaldehyde process

NOTE! Prepare as follows if a formaldehyde program is to be used.

Formaldehyde is a toxic matter. See also General advice for formaldehyde sterilizers in chapter OPERATION.

- Select a formaldehyde program and wait for the sterilizer to heat up to appropriate sterilization temperature (about 45 m).
- Keep the sterilizer doors closed if starting with a cold sterilizer. Leave door open if sterilizer temperature exceeds sterilization temperature.
- Push an 100 ml infusion bottle type DIN 58 366, (DIN Leicht) filled with formaldehyde as specified below, into the flask holder.

Sterilizer type:	GE449
34 - 38% formaldehyde:	90 ml

QAX068 . . . . . .GE66X Formaldehyde process

NOTE! Prepare as follows if a formaldehyde program is to be used.

Formaldehyde is a toxic matter. See also General advice for formaldehyde sterilizers in chapter OPERATION.

- Start if possible with a cold sterilizer.
- Select a formaldehyde program and wait for the sterilizer to heat up to appropriate sterilization temperature (about 45 m).
- Keep the sterilizer doors closed if staring with a cold sterilizer. Leave door open if sterilizer temperature exceeds sterilization temperature.
- Push an 500 ml infusion bottle type DIN 58 363, (DIN Leicht) filled with formaldehyde as specified below, into the flask holder.

Sterilizer type:	GE 666	GE 669	GE 6612
34 - 38% formaldehyde:	200 ml	300 ml	400 ml

QAX074 . . . . . .GE2066 Formaldehyde process

NOTE! Prepare as follows if a formaldehyde program is to be used.

Formaldehyde is a toxic matter. See also General advice for formaldehyde sterilizers in chapter OPERATION.

- Start if possible with a cold sterilizer.
- Run a leak test.
- Select a formaldehyde program and wait for the sterilizer to heat up to appropriate sterilization temperature (about 45 m).
- Keep the sterilizer doors closed if staring with a cold sterilizer. Leave door open if sterilizer temperature exceeds sterilization temperature.
- Insert a 500 ml DIN 58 363 (DIN Leicht) infusion flask, filled with the below-specified quantity of formalin, into the flask holder and close the securing clip over the flask.

QAM018. . . . . .GEF-449 Supplementary preparation B2501 B2502

- Run the first steam sterilization process of the day with the chamber empty. This heats up and drains the pipe system of the installation.

QAX 075. . . . . . GE2066

Password-protected programs

Programs that are not intended to be used routinely are protected with a password. Some degree of consideration is called for before a password-protected programs is chosen. Examples include test programs, programs for emergency situations, programs with selectable parameters or programs using some sterilization medium other than steam.

QAX076 . . . . . .OP2...GE2066

Starting a password-protected program:

A Select the program and press ***Start***.

B The display shows the entry menu for the password.

C Press ***Enter***.

D Enter the password using the arrow keys and press ***Enter*** again.

If the parameters are to be changed, this must be done before pressing Start.

QAX077 . . . . . .OP3, FPC....GE2066

Starting a password-protected program:

A Select Start program on the main menu and press ***Enter***.

B Select the program from the program menu or by the function keys and press ***Enter***.

C Press ***Start***.

D Enter the password and press ***Enter***.

If the parameters are to be changed, press function key **F10** before ***Start***, followed by entry of the required parameters via the Parameter input menu. See also the CONTROL UNIT chapter.

QAX078 . . . . . .GE2066

Parameter password

Before a selectable parameter can be changed, a parameter password must be entered, after which all parameters (see Program combination) can be changed.

QAX079 . . . . . .GE2066 General

Running programs

QAX080 . . . . . .GE2066 / B2

- Place the temperature sensor in the load when liquids are to be sterilized.

QAX092 . . . . . .GE2066 / B2

- Place the temperature sensor in the load when liquids are to be sterilized.

There is a risk of explosive boiling-over or even of flasks bursting if the load sensor is not placed in the load when liquids are to be sterilized.

QAX081 . . . . . .GE2066 Manual loading OP2/FPC

- Select the required program, which will be displayed on the control panel.
- Load the sterilizer.
- Check that the Steam supply pressure gauge shows at least 250kPa.
- Close the door by pressing the ***Close doo***r →|← n. This is not necessary if automatic door closing has been programmed.
- Start the process by pressing the ***Start*** |◇ɔn when the lamp is lit.

QAH008 . . . . . .GED Man. charging OP2/FPC

- Select desired program. The selected program is indicated on the control panel.
- Charge the autoclave.
- Check that the pressure gauge ***Steam supply*** shows at least 50 kPa.
- Close the door by pressing the ***Close door*** button →|← . However, this is not necessary if automatic door closing has been programmed. If closing of the door is prevented by external factors, it will stop. Release the button and remove the obstruction, after which the door can be closed by pressing the button.
- Start by pressing the ***Start*** button ◇ when the lamp lights up.

- Select desired program. The selected program is indicated on the control panel.
- Turn and remove the DOOR-BLOCKING KEY before charging if anyone needs to enter the chamber. Reset the key when charging is finished.
- Charge the autoclave.
- Check that the pressure gauge ***Steam supply*** shows at least 250 kPa.
- Close the door by pressing the ***Close door*** button ⇥|⇤ and hold it down until the door has closed completely. This is not required if automatic door closing has been programmed.
- If closing of the door is obstructed, it will stop. Release the button and remove the obstruction, after which the door can be closed.
- Start by pressing the ***Start*** button ◇ n the lamp lights up.

- Turn and remove the DOOR BLOCKING KEY and charge the autoclave.
- Press the START button. The different stages of the process are indicated by the LEDs "Door(s) closed, "Door(s) closed and locked", Process in progress" and "Process finished ".
- After the process has been completed, the PROCESS FINISHED LED lights up. Press the OPEN DOOR button if the door on the unloading side does not open automatically.
- Immediately select another process if the same process is not to be used again.

Important!
If the unloading door is programmed to be opened manually and is not opened within 20 minutes after a formalin process has been completed, the following will occur.
The "Process finished" lamp goes out.
The doors are blocked and the "Door" lamp starts to flash, and at the same time brief ventilation of the chamber starts. The ventilation will then be repeated every twenty minutes for as long as no door is opened.

To open the door:
Wait until the "Door" lamp starts to flash.
Press the "Door" button, whereupon the "Process finished" lamp lights up and the door can be opened.

Finishing

Unless otherwise specified in local regulations:

- Disconnect the operating power supply by activating the switch on the control system.
- Check and if necessary clean the screen in the bottom of the chamber.
- Shut off valves for incoming media.

QAV019 . . . . . .Sterilizer with automatic loading

Starting a program that has not been programmed for automatic starting

- Press the “Auto load” button. The lamp in the button does not light up. Loading takes place as the chosen program starts.

Starting a program that has been programmed for automatic starting

- Press the “Auto load” button. The lamp in the button lights up. Loading takes place as the chosen program starts. New loading and starting then take place automatically as soon as the loader has been filled and the current program is completed.
- Press the “Auto load” button. The lamp in the button goes out and automatic starting ceases.

Note: Automatic starting is cancelled in the event of an alarm.

QAX082 . . . . . .GE2066 General

Beware of hot surfaces inside the sterilizer chamber when door is open!

- The control panel displays progress of the process.
- The ***Process completed*** (↻) lights on completion of a fault-free process. Press the ***Door open*** ↤|↦ button if the door on the discharge side does not open automatically.
- Select a new program immediately unless the same program is to be used for the next sterilization.

Running of program

Beware of hot surfaces inside the chamber when the door of the sterilizer is open. The sterilized items are hot immediately after being unloaded. Leave to cool before use

- The first steam process of the day is run with the chamber empty. Alternatively a leak test is to be run in formal sterilization.
- Press the button for the desired program. The lamp in the button must light up.
- Charge the sterilizer.
- Check that the "Steam supply" pressure gauge shows at least 250 kPa.
- Close the door by lifting the door handle with **both hands**.
- Press the "Start" button. The progress of the process is shown on the display.
- The "Process completed" lamp is lit after a completed, fault-free process. Open the door on the unloading side when the door seal has been drawn in. The "Process completed" lamp goes out.
- Immediately select new program if the same one is not to be used in the next sterilization.

Running of program

Beware of hot surfaces inside the chamber when the door of the sterilizer is open. The sterilized items are hot immediately after being unloaded. Leave to cool before use

- The first steam process of the day is run with the chamber empty. Alternatively a leak test is to be run in formal sterilization.
- Press the button for the desired program. The lamp in the button must light up.
- Charge the sterilizer.

- Check that the "Steam supply" pressure gauge shows at least 140 kPa.
- Close the door by lifting the door handle with **both hands**.
- Press the "Start" button. The progress of the process is shown on the display.
- The "Process completed" lamp is lit after a completed, fault-free process. Open the door on the unloading side when the door seal has been drawn in. The "Process completed" lamp goes out.
- Immediately select new program if the same one is not to be used in the next sterilization.

QAM019. . . . . .GEF-449 supplementary daily preparation

Note: Prepare a formalin process as follows:

Formalin is toxic. See the section headed General advice for formalin sterilizers in the chapter on OPERATION.

- Preferably start with a cold sterilizer.
- Run a leak test.
- Select a formalin program and wait while the sterilizer is heated up to the correct sterilization temperature (approx. 45 min).
- Keep the sterilizer door closed if heating is taking place from cold sterilizer. Leave the door open if the temperature of the sterilizer is higher than the selected sterilization temperature.
- Press a 100 ml DIN 58 366 (DIN Leicht) infusion bottle containing 90 ml 35% stabilized formalin solution down into the bottle holder. Lower the lock brace over the bottle.

QAX083 . . . . . .GE2066 Formalin

Note:
If the discharge door is programmed to be opened manually, but is not opened within 20 minutes of completion of a formalin process, the following will occur:
The ***Process completed*** ↻ will go out.
The doors will be held closed and the ***Door open*** ↤|↦ lamp will start to flash, while a short ventilation of the chamber will start. Ventilation will be repeated every 20 minutes until a door is opened.

To open the door:
Wait until the lamp has stopped flashing.
Press the ***Door open*** ↤|↦ button to open the door.

QAX097 . . . . . .Unloading and process control… addition MDD

Process checking and item handling

Check that the completed process has been carried out correctly by comparing the process printout with a corresponding type load printout from the sterilizer validation.

Unload the items and put them in an area where any quantity of heat given off by the load has a minimal impact on the working environment. If the sterilizer is an ethylene oxide sterilizer, some residual degassing may also occur.

Note that the items may be very hot immediately after unloading.
Leave the items to cool or wear safety gloves to handle them.

QAM022. . . . . .GEF-449 Running of program. Addition for formalin

Note:
If the unloading door is not opened within 20 minutes after a formalin process has been completed, the following will occur:
The ***Process completed*** lamp ↻ out.
The doors are blocked and the ***Open door*** lamp ↤|↦ to flash, and brief ventilation of the chamber starts at the same time. The ventilation will then be repeated every twenty minutes as long as no door is opened.

To open the door:
Wait until the lamp stops flashing. The door can then be opened

QAM012. . . . . .Sterilizer with manually operated door

Running programs

- Press the button for the required program. The lamp in the button lights up.
- Load the sterilizer.
- Check that the "Steam supply" pressure gauge reads at least 170kPa.
- Close the door by lifting the door handle **with both hands**.

QAM016. . . . . .Sterilizer with manually operated door

Running programs

- Press the button for the required program. The lamp in the button lights up.
- Load the sterilizer.
- When liquids are to be sterilized, place a temperature transducer in the load.

There is a risk of explosive boiling-over or even of flasks bursting if the load sensor is not placed in the load when liquids are to be sterilized.

- Check that the “Steam supply” pressure gauge reads at least 170kPa.
- Close the door by lifting the door handle **with both hands**.

QAM013. . . . . .Running programs

Running programs

- Press the button for the required program. The lamp in the button lights up.
- Load the sterilizer.
- Check that the “Steam supply” pressure gauge reads at least 250 kPa.
- Close the door by lifting the door handle **with both hands**.

QAX071 . . . . . .General

Sterilizing

- Check that there is recording paper enough for the forthcoming process

QAX040 . . . . . .General

QAX065 . . . . . .General GED

Disinfect / Sterilize

- Check that there is recording paper enough for the forthcoming process

QAX043 . . . . . .Sterilizer with a chamber that can be entered

- Turn and remove the door blocking key and load the sterilizer.

QAX044 . . . . . .Sterilizer with a chamber that can not be entered

- Load the sterilizer.

QAX045 . . . . . .Sterilizer with load sensor

- Place the temperature transducers intended for this purpose, in the load.

QAX046 . . . . . .Sterilizer with a chamber that can be entered

- Restore and turn the door blocking key.

QAX057 . . . . . .OP2 VER. 2.0

- Push the button for one of the programs 1 - 6 or use ⇧ to scroll to the desired program. The button light of the pressed program button should illuminate. The button light will also illuminate when scrolling from program on to six else the program button lights are out.
- Only if the operator adjustable parameters are to be changed, step the system to menu ”Parameter Password” and enter the password and set the required parameters.

QAX041 . . . . . .OP2

- Push the button for the program desired. The button light should illuminate.
- Only if the operator adjustable parameters are to be changed, step the system to menu ”Operator Password” and enter the password and set the required parameters.

QAX042 . . . . . .OP3

- Select ”Start program” from the ”Main menu”. Then select suitable program from the list on the screen.
- Only if the operator adjustable parameters are to be changed, enter the password and set the required parameters.

QAX093 . . . . . .OP-Touch

- Choose the required program by pointing to one in the list on the screen. If the sterilizer has more than eight programs, use the >> or << keys to call up the next groups of programs.
- Press EDIT if you want to change a selectable parameter, otherwise press NEXT.

QAH005 . . . . . .General, horizontally operated door

- Check that the pressure gauge STEAM SUPPLY shows at least 270 kPa.
- Close the door by pushing the button ”Close Door” until the door is completely closed.

QAH006 . . . . . .General, horizontally operated door, GED

- Check that the pressure gauge STEAM SUPPLY shows at least 50 kPa.
- Close the door by pushing the button ”Close Door” until the door is completely closed.

QAV015 . . . . . .General, vertically operated door

- Check that the pressure gauge STEAM SUPPLY shows at least 270 kPa.
- Close the door by pushing the button ”Close Door”.

QAV018 . . . . . .Sterilizer with automatic loading

Starting a program that has not been programmed for automatic starting

- Press the “Auto load” button. The lamp in the button does not light up. Loading takes place as the chosen program starts.

Starting a program that has been programmed for automatic starting

- Press the “Auto load” button. The lamp in the button lights up. Loading takes place as the chosen program starts. New loading and starting then take place automatically as soon as the loader has been filled and the current program is completed.
- Press the “Auto load” button. The lamp in the button goes out and automatic starting ceases.

Note: Automatic starting is cancelled in the event of an alarm.

QAX058 . . . . . .General

- Push the button ”Start”. The process stages will be indicated by the light indicators ”Door(s) Closed”, ”Door(s) sealed and locked”, ”In progress” and ”Process complete”.
- On completion of a satisfactory process, the light indicator ”Process complete” illuminates. If the unloading door is not automatically opened, push the appropriate button ”Open Door”.
- Select immediately new program if the same one should not be used next time.

Close down

Unless otherwise prescribed by local rules:

- Switch off the control unit power switch.
- Check and clean the chamber drain strainer.
- Shut off supplies for cold water, steam and compressed air.

QAX066 . . . . . .General, GED, Formaldehyde

- Push the button ”Start”. The process stages will be indicated by the light indicators ”Door(s) Closed”, ”Door(s) sealed and locked”, ”In progress” and ”Process complete”.
- On completion of a satisfactory process, the light indicator ”Process complete” illuminates. If the unloading door is not automatically opened, push the appropriate button ”Open Door”.
- Select immediately new program if the same one should not be used next time.

NOTE!
If the unloading door was programmed for manual operation but not opened within 20 minutes after the termination of a formaldehyde process, the following happens
The lamp ”Process complete” extinguishes.
The doors are locked again and the lamp ”Door” starts flashing as a brief ventilation of the chamber starts. This ventilation is repeated every 20 minutes as long as no door is opened.

To open the sterilizer door
Wait until the lamp ”Door” stops flashing then push the button ”Door”. The lamp ”Process end” illuminates gain and the door can be opened.

Close down

Unless otherwise prescribed by local rules:

- Switch off the control unit power switch.
- Check and clean the chamber drain strainer.
- Shut off supplies for cold water, steam and compressed air.

QAX069 . . . . . .General, GE, Formaldehyde

- Push the button ”Start”. The process stages will be indicated by the light indicators ”Door(s) Closed”, ”Door(s) sealed and locked”, ”In progress” and ”Process complete”.
- On completion of a satisfactory process, the light indicator ”Process complete” illuminates. If the unloading door is not automatically opened, push the appropriate button ”Open Door”.
- Select immediately new program if the same one should not be used next time.

NOTE!
If the unloading door was programmed for manual operation but not opened within 20 minutes after the termination of a formaldehyde process, the following happens
The lamp ”Process complete” extinguishes.
The doors are locked again and the lamp ”Open Door” starts flashing as a brief ventilation of the chamber starts. This ventilation is repeated every 20 minutes as long as no door is opened.

To open the sterilizer door
Wait until the lamp ”Open Door” stops flashing then push the button ”Open Door”. The lamp ”Process end” illuminates again and the door can be opened.

Maintenance program

- A leak-test shall be done at least once a week. *No bottle shall be placed in the bottle holder*.
- Remainders of formaldehyde, in places difficult to reach as in pipes, can be removed by running a chamber cleaning process with an empty chamber. This should be done at least once a week.
  Before starting a cleaning process *an empty infusion flask is to be placed in the formaldehyde flask holder* to prevent formaldehyde from escaping from the chamber. The flask shall be locked with the clamp.

NOTE: the flask will be warm:
See also General advice for formaldehyde sterilizers in the chapter OPERATION.

Close down

Unless otherwise prescribed by local rules:

- Switch off the control unit power switch.
- Check and clean the chamber drain strainer.
- Shut off supplies for cold water, steam and compressed air.

QAM014. . . . . .General, GE, Formalin, Manual door

- Press the START pushbutton. The various stages of the process will be indicated by the LEDs: 'Door(s) closed', 'Door(s) closed and fastened', 'Process in operation' and 'Process complete'.
- The 'Process complete' LED lights when the process is completed.
- Select another process immediately unless the same process is to be repeated.

Note!
If the discharge door does not open within 20 minutes after conclusion of a formalin process, the following will happen:
The 'Process complete' LED will go out.
The doors will be prevented from opening, the 'Door' LED will start to flash and a short ventilation process of the chamber will start. This ventilation will be repeated every 20 minutes until a door is opened.

To open the door:
Wait until the 'Process complete' LED lights and then open the door.

Maintenance program
(Requires an authorisation code to be entered)

- A leakage test must be performed at least once a week, using an empty container in place of the formalin bottle.
- Formalin residues in difficult-to-reach parts, such as pipe connections etc., can be removed by performing a chamber purge program, which should be done once a week. When starting this purge program, make sure that an empty bottle has been fitted in the bottle-holder. The bottle must be secured by the bottle retainer in order to prevent formaldehyde from being discharged to the room.

Note:
The bottle will become hot.
See also the section entitled 'General notes for formalin sterilizers' in the OPERATION chapter.

Closing down

Unless other rules apply under local regulations:

- Turn off the control power supply by the switch on the front panel.
- Inspect and, if necessary, clean the strainer in the bottom of the chamber.
- Turn off the incoming media valves.

QAX054 . . . . . .General. Hospital division.

Flashing lamp “Process complete”

Completed Bowie/Dick or maintenance program is indicated by a flashing lamp

Program stop or blowing safety valve

A program can be stopped with the EMERGENCY STOP button on the front panel without affecting the sterilizer control system.

- Press the EMERGENCY STOP button.
- Press the C button.

Never switch off the power switch of the control unit, since doing this disables the safety system of the sterilizer. In an emergency, the main switch of any steam generator can be switched off.

- Various options for action are described in the section headed “Alarms” in the chapter entitled “Operation”.

Actions on alarms

- Note the error code and the process phase when the fault occurred.
- Acknowledge the fault by pressing the C button.
- Various options for action are described in the section headed “Alarms” in the chapter “Operation”.

QAX089 . . . . . .General. Hospital Division,

Flashing 'Process complete' lamp

The lamp flashes to indicate that the maintenance program has finished.

Program stop or operation of the safety valve

Any program can be interrupted by the EMERGENCY STOP pushbutton on the front panel without affecting the sterilizer's safety system.

- Press the EMERGENCY STOP pushbutton.
- Press the C pushbutton.

Never turn off the main power supply to the control unit, as this will disconnect the sterilizer's safety system.
In an emergency, the main switch for the steam generator (if present) may be opened.

- Various options for action are described in the 'Alarms' section in the OPERATION chapter.

Responses to an alarm

- Note the fault code and in which phase of the process it occurred.
- Acknowledge the fault by pressing pushbutton C.
- Various options for action are described in the 'Alarms' section in the OPERATION chapter.

QAX090 . . . . . .General. Hospital division

Flashing lamp “Process complete”

Completed Bowie/Dick or maintenance program is indicated by a flashing lamp

Program stop or blowing safety valve

A program can be stopped with the EMERGENCY STOP button on the front panel without affecting the sterilizer control system.

- Press the EMERGENCY STOP button.

- Press the C button.

Turn the control power supply mains switch off only as a last resort, as this affects the sterilizer's safety system. The main power supply switch or disconnector to the sterilizer may be turned off only in an emergency.

If a formalin process is interrupted, or if there is positive pressure in the chamber, the room in which the sterilizer is installed should be evacuated.

- Various options for action are described in the section headed “Alarms” in the chapter entitled “OPERATION”.

Actions on alarms

- Note the error code and the process phase when the fault occurred.
- Acknowledge the fault by pressing the C button.
- Various options for action are described in the section headed “Alarms” in the chapter “OPERATION”.

QAX091 . . . . . .GE2066 FPC

Flashing lamp “Process complete”

Completed Bowie/Dick or maintenance program is indicated by a flashing lamp

Program stop or blowing safety valve

A program can be stopped with the EMERGENCY STOP button on the front panel without affecting the sterilizer control system.

- Press the EMERGENCY STOP button.
- Press the F10 button.

Turn the control power supply mains switch off only as a last resort, as this affects the sterilizer's safety system. The main power supply switch or disconnector to the sterilizer may be turned off only in an emergency.

If a formalin process is interrupted, or if there is positive pressure in the chamber, the room in which the sterilizer is installed should be evacuated.

- Various options for action are described in the section headed “Alarms” in the chapter entitled “OPERATION”.

Actions on alarms

- Note the error code and the process phase when the fault occurred.
- Acknowledge the fault by pressing the F10 button.
- Various options for action are described in the section headed “Alarms” in the chapter “OPERATION”.

QAX085 . . . . . .GE2066 Formalin.

If an alarm is generated as a result of high pressure during formalin sterilization, the chamber must be evacuated by the vacuum pump. See also the General Advice section for formalin sterilizers in the OPERATIONS chapter.

- Call a service technician.

QAX055 . . . . . .Password. Hospital division.

After a fault in a process, the password must be entered before the loading side door can be opened.

QAX096 . . . . . .Alarm charger general

A more detailed description of how automatic loading or unloading is handled after an alarm or if problems arise during the actual load cycle is given in the section headed "Automatic chargers" in the chapter on OPERATION.

QAX056 . . . . . .Before close down. Hospital division.

Actions on completion of work

Unless local routines state otherwise:

- Close the valves for cold water and compressed air and steam, if any.
- Switch off the main power switch of the control system.
- If necessary:
  Shut down the sterilizer to cool down, e.g. by hanging up a notice stating that it must not be started until the morning of the next day.

- Clean the inside of the chamber, using a chlorine-free cleaner if necessary.

The sterilizer must always be cold when cleaned. To prevent injury, switch of the power to the control system.

Instructions for cleaning are given in the section headed “Genera advice for using the sterilizer”, in the chapter “Operation”.

QAX088 . . . . . .Close-down procedures. 2066. Hospital division

Actions on completion of work

Unless local routines state otherwise:

- Close the valves for cold water and compressed air and steam.
- Turn off the power supply main switch.

If necessary:

- Shut down the sterilizer to cool down, e.g. by hanging up a notice stating that it must not be started until the morning of the next day.
- Clean the inside of the chamber. See the cleaning instructions in the “Weekly Cleaning” section in the OPERATIONS chapter

NB:
The sterilizer must always be cold when cleaned.

QAX086 . . . . . .GE2066 Formalin

Maintenance program

- A leak test, using an empty formalin flask, must be performed before each formalin process and at least once a week.
- Formalin residues in difficult-to-reach areas, such as pipe connections etc., can be removed by running a cleaning program, which should be done at least once a week. A suitable time to do this is at the end of the working day, so that the sterilizer can cool down during the night. Before starting the cleaning program, an empty infusion flask must be placed in the flask holder and secured with the

clamp. This prevents formaldehyde from being discharged to the room.

NB: The flask will be hot.
See also General advice for formaldehyde sterilizers in the OPERATIONS chapter.

QAX048 . . . . . .OP2

Alarm

In case of an alarm:

Read the Error message.

Push button C, thereby confirming the observation of the error and silencing the audio signal.

Consult the ”OPERATOR MANUAL”

QAX049 . . . . . .OP3

Alarm

In case of an alarm:

Read the Error message.

Push button F10, thereby confirming the observation of the error and silencing the audio signal.

Consult the ”OPERATOR MANUAL”

QAX050 . . . . . .A-version

Blowing safety valve

- Press the STOP button.

- Call for a technician.

QAX051 . . . . . .E-version

Blowing safety valve

- Press the STOP button.
- If ineffective, cut the power with the ***wall-mounted isolator*.**

Don't break the power with the Power-switch in the auto-clave front!

- Call for a technician.

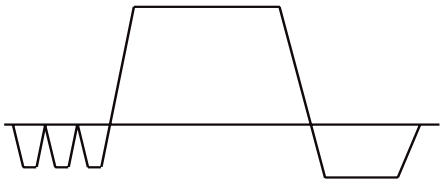
Program combination

GETINGE

Program combination A2110

Utensils, textiles

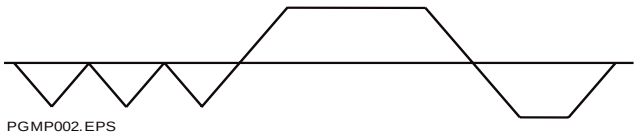
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min- 99 h
Drying vacuum time: 0 min- 99 h

Filter, utensils

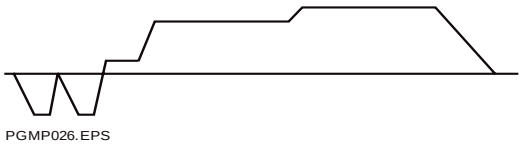
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99 h
Slopes: 50 - 1000 mbar / min

Ampoules *Cooling*

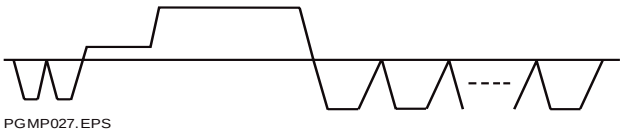
P3



PARAMETER RANGES
Prevacuum: 0 - 5 pulses
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Support press.: 1,5 - 3,5 bar(a)
Cooling temp.: 20 - 90 °C

Ampoules *Drying*

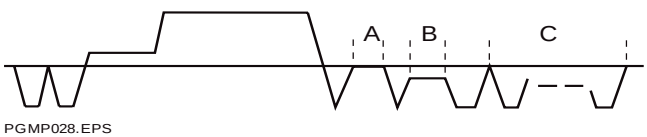
P4



PARAMETER RANGES
Prevacuum: 0 - 5 pulses
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99 h
Drying: 0 - 10 pulses

Ampoules *Crack test, rinsing, drying*

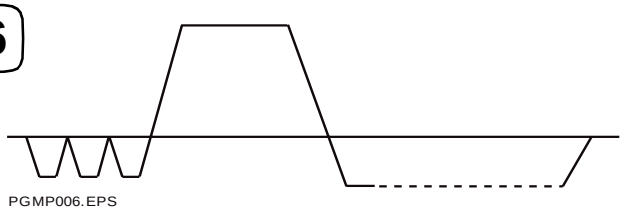
P5



PARAMETER RANGES
Prevacuum: 0 - 5 pulses
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Crack vacuum: 50- 1000 mba
Rinse time (A): 0 min - 99 h
Warm up (B): 40 - 95 °C
Drying (C): 0 - 10 pulses

Automatic leak rate test

P6



PARAMETER SETTINGS
Temp.: 135 °C
Time: 7 min
Max accepted leak rate:
13 mbar/10 min

RAX001

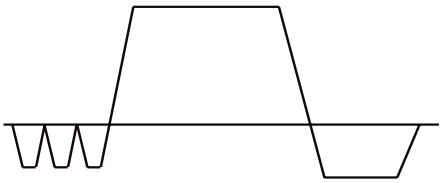
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination A2120

Utensils, textiles

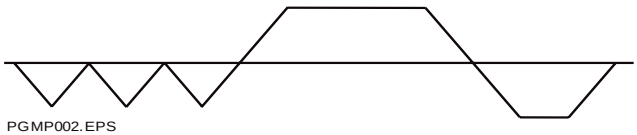
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99 h

Filter / Utensils

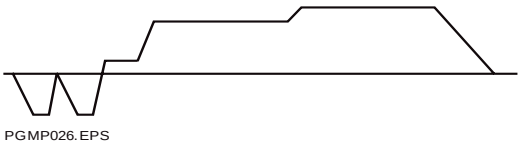
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99 h
Slopes: 50 - 1000 mbar/ minm

Ampoules *Cooling*

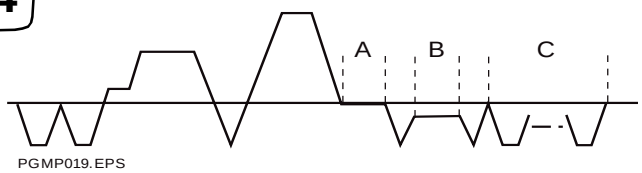
P3



PARAMETER RANGES
Prevacuum: 0 - 5 pulses
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Support press.: 1,5 - 3,5 bar(a)
Cooling temp.: 20 - 90 °C

Ampoules *Crack test, dye test, rinsing, drying*

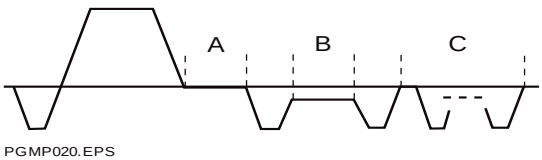
P4



PARAMETER RANGES
Prevacuum: 0 - 5 pulses
Ster. temp.: 100 - 135 °C time: 0 min - 99 h
Crack vacuum: 50- 1000 mba
Dye test: 1000 - 3700 mbar
Rinse time (A): 0 min - 99 h
Warm up (B): 40 - 95 °C
Drying (C): 0 - 10 pulses

Ampoules *Separate dye test, rinsing, drying*

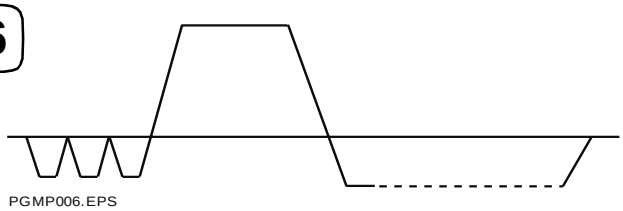
P5



PARAMETER RANGES
Prevacuum: 50 - 1000 mbar
Dye test: 1000 - 3700 mbar
Rinse time (A): 0 min - 99 h
Warm up (B): 40 - 95 °C
Drying (C): 0 - 10 pulses

Automatic leak rate test

P6



PARAMETER SETTINGS
Temp.: 135 °C
Time: 7 min
Max accepted leak rate:
13 mbar/10 min

RAX002

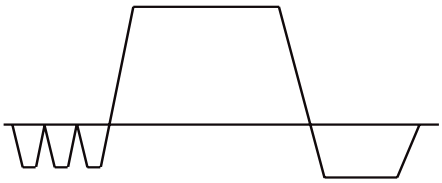
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination C2110

Utensils, glassware, empty containers

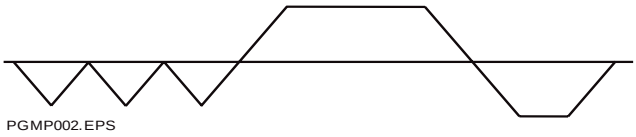
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Filter

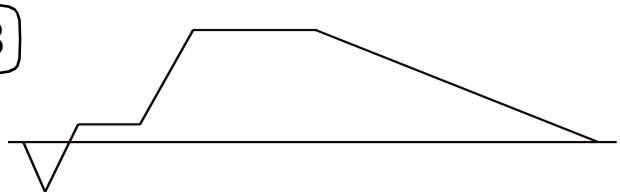
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar/ mi

Liquids in open or vented containers

P3



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h

General purpose GEC cycle for sealed glass or plastic containers

P4

PARAMETER RANGES
Ster. temp.: 100 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

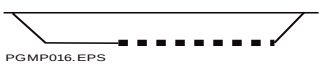
General purpose GEC cycle for sealed glass or plastic containers

P5

PARAMETER RANGES
Ster. temp.: 100 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

Automatic leak rate test

P6



PARAMETER SETTINGS
Max. accepted leak rate:
13 mbar/10 min

RAX003

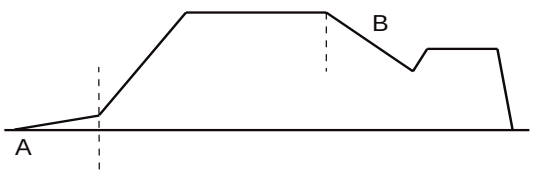
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination C2120

General purpose GEC cycle for sealed glass or plastic containers

P1

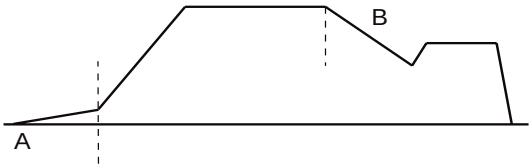


PGMP010.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

P2

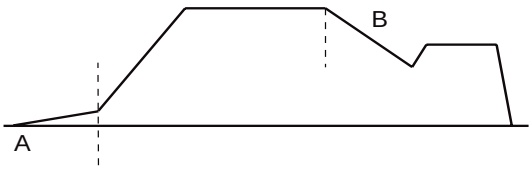


PGMP010.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

P3



PGMP010.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

P4

PGMP007.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

P5

PGMP007.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

P6

PGMP007.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

RAX004

Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination C2130

General purpose GEC cycle for sealed glass or plastic containers

P1

PGMP007.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

P2

PGMP007.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

P3

PGMP007.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

P4

PGMP007.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

General purpose GEC cycle for sealed glass or plastic containers

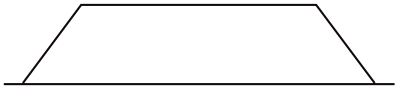
P5

PGMP007.EPS

PARAMETER RANGES
Ster. temp.: 80 - 124°C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add.: 0,3 - 1,5 bar
Cooling temp.: 20 - 80 °C

Trough emptying

P6



PGMP044

PARAMETER RANGES
Driving pressure: 1,5 - 2,5 bar(a)

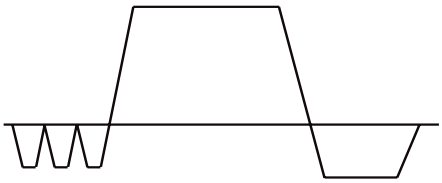
RAX025

Hazardous waste must not be processed in this sterilizer.

Program combination L2200

Utensils / Textiles

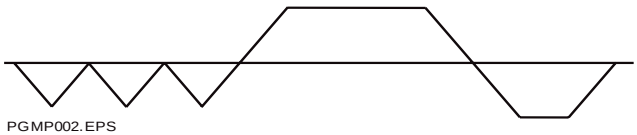
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Filter / Utensils

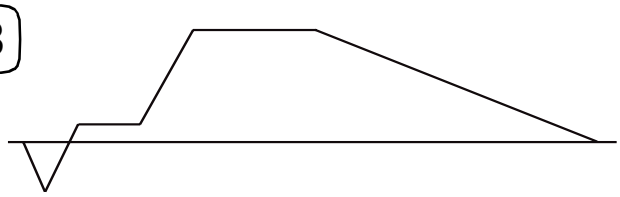
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar/ mi

Liquids in open or vented containers

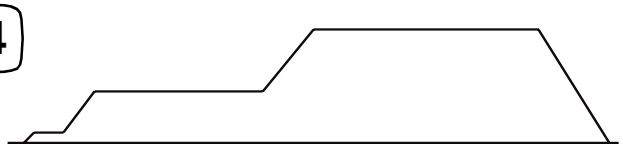
P3



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h

Liquids in sealed containers *Jacket cooling*

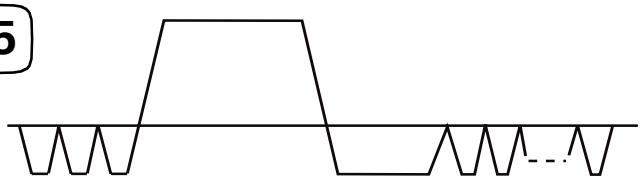
P4



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Air cool press.: 1,5 - 3,5 bar(a)
Cooling temp.:40 - 8 °C

Rubber stoppers

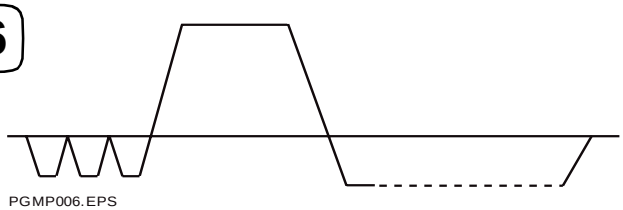
P5



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Drying: 0 - 10 pulses

Automatic leak rate test

P6



PARAMETER SETTINGS
Temperature: 13 °C
Time: 7 mi
Max accepted leak rate:
13 mbar/10 min

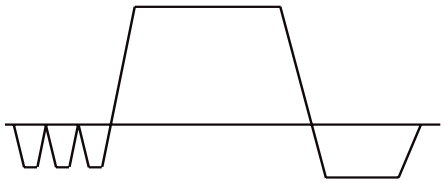
RAX037

Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

Program combination L2220

Utensils, glassware, empty containers, textiles, plastic, rubber

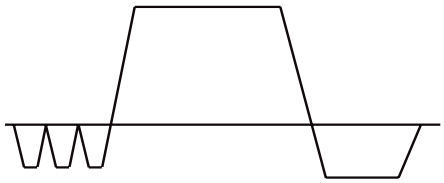
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Macrolon cages

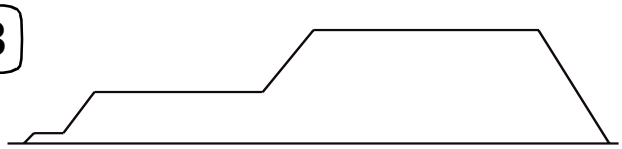
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Liquids in sealed (or open) containers

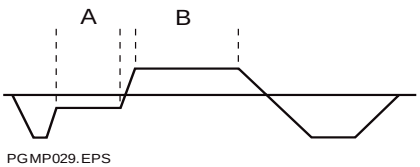
P3



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Air cool press.: 1,5 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C
Optional prevacuum

Fodder

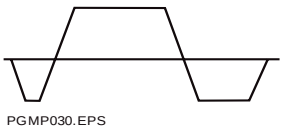
P4



PARAMETER RANGES
Hold temp (A): 50 - 100 °C
Hold time (A): 0 min - 99 h
Hold temp (B): 50 - 135 °C
Hold time (B): 0 min - 99 h
Drying vacuum time: 0 min - 99
Drying slope: 50 - 1000 mbar/ min

Bedding

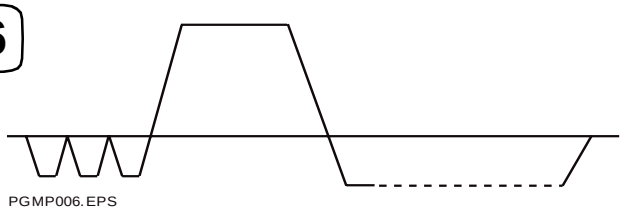
P5



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum: 1 - 10 pulses

Automatic leak rate test

P6



PARAMETER SETTINGS
Temperature: 13 °C
Time: 7 mi
Max accepted leak rate:
13 mbar/10 min

RAX006

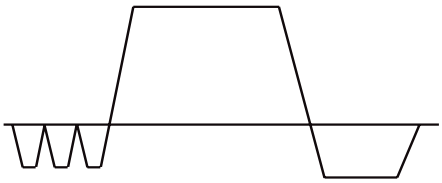
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination L2300

Utensils / Textiles

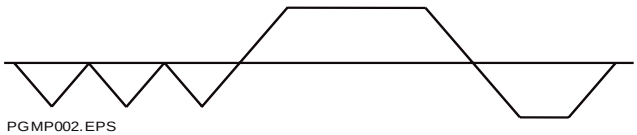
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Filter / Utensils

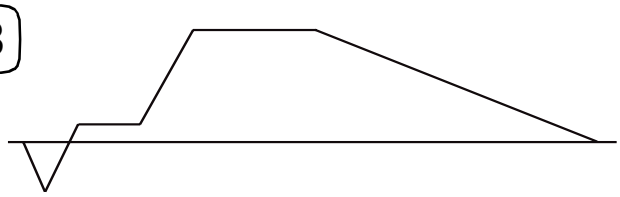
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar/ mi

Liquids in open or vented containers

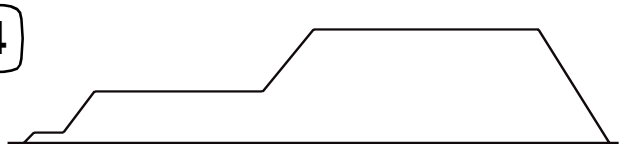
P3



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h

Liquids in sealed containers *Fan assisted jacket cooling*

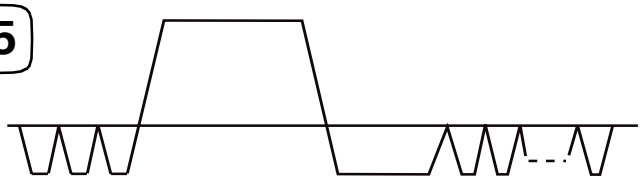
P4



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Air cool press.: 1,5 - 3,5 bar(a)
Cooling temp.:40 - 8 °C
Optional prevacuum

Rubber stoppers

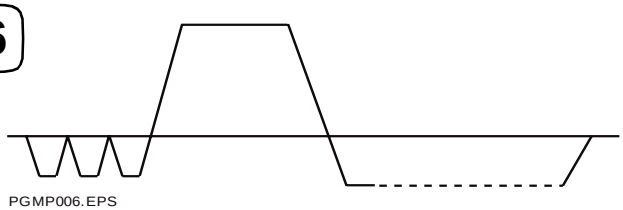
P5



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Drying: 0 - 10 pulses

Automatic leak rate test

P6



PARAMETER SETTINGS
Temperature: 13 °C
Time: 7 mi
Max accepted leak rate:
13 mbar/10 min

RAX058

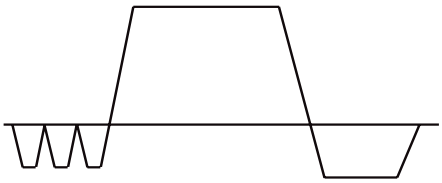
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination L2310

Utensils / Textiles

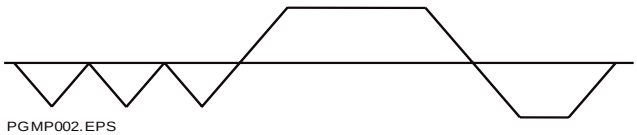
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Filter / Utensils

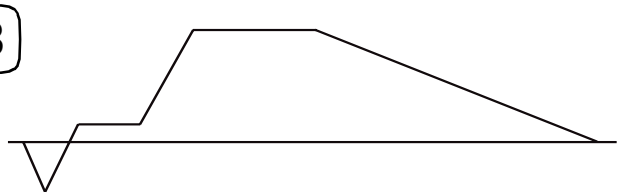
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar/ mi

Liquids in open or vented containers

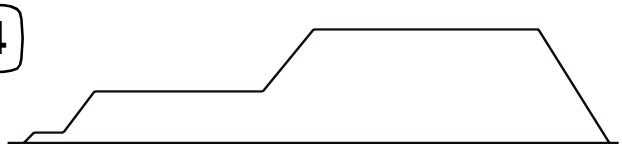
P3



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h

Liquids in sealed containers *Fan assisted jacket cooling*

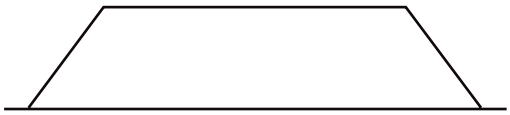
P4



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Air cool press.: 1,5 - 3,5 bar(a)
Cooling temp.:40 - 8 °C
Optional prevacuum

Liquid and non porous waste deactivation *Jacket cooling & fan*

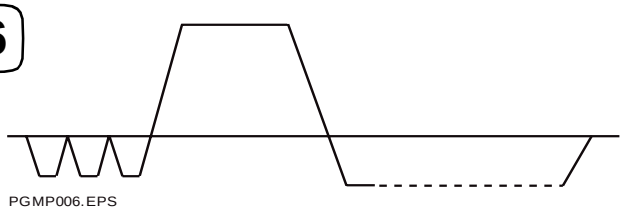
P5



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h

Automatic leak rate test

P6



PARAMETER SETTINGS
Temperature: 13 °C
Time: 7 mi
Max accepted leak rate:
13 mbar/10 min

RAX059

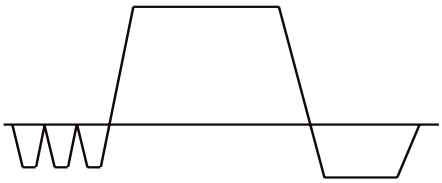
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination L2310

Utensils / Textiles

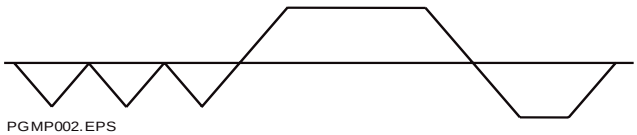
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Filter / Utensils

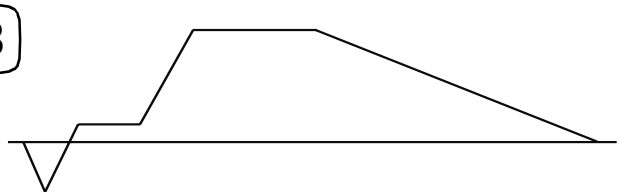
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar/ mi

Liquids in open or vented containers

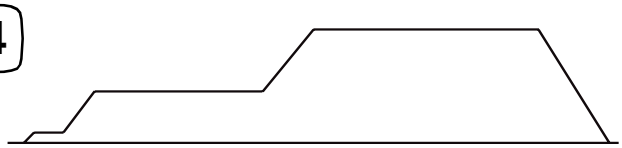
P3



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h

Liquids in sealed containers *Fan assisted jacket cooling*

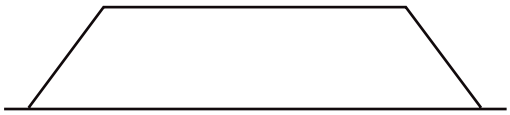
P4



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Air cool press.: 1,5 - 3,5 bar(a)
Cooling temp.:40 - 8 °C
Optional prevacuum

Liquid and non porous waste deactivation *Jacket cooling & fan*

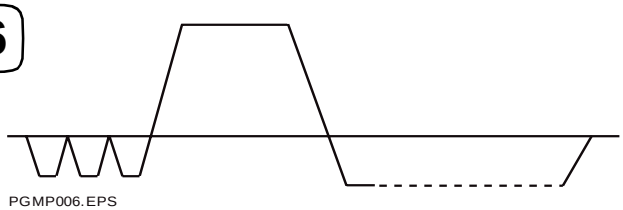
P5



PARAMETER RANGES
Ster. temp.: 100 - 121 °C
Ster. time: 0 min - 99 h

Automatic leak rate test

P6



PARAMETER SETTINGS
Temperature: 13 °C
Time: 7 mi
Max accepted leak rate:
13 mbar/10 min

RAX060

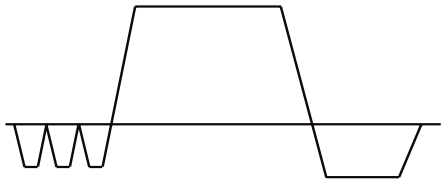
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination V2110

Utensils, glassware, textiles

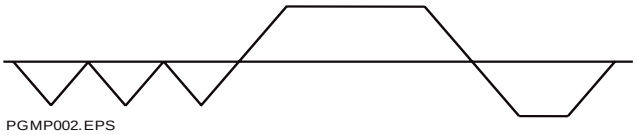
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Filter

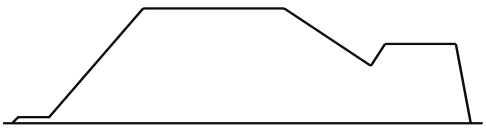
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar/ mi

Sealed plastic or flexible containers

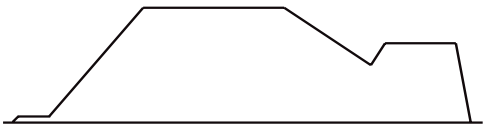
P3



PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed plastic or flexible containers

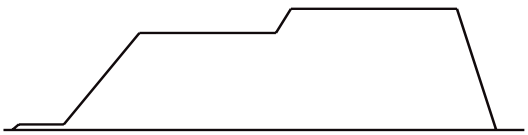
P4



PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers

P5



PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Automatic leak rate test

P6

PARAMETER SETTINGS
Max. accepted leak rate:
13 mbar/10 min

RAX007

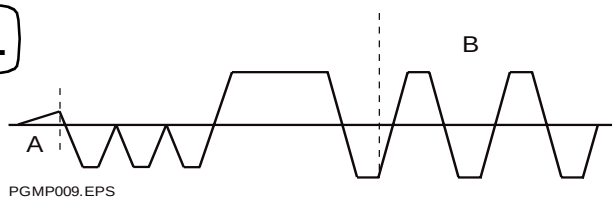
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination V2120

Utensils, glassware, textiles, special products

P1

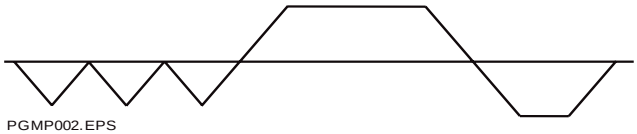


PGMP009.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Dry heat time.(A): 0 min - 99 h
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99 h
Drying (B): 0 - 10 pulses

Filter

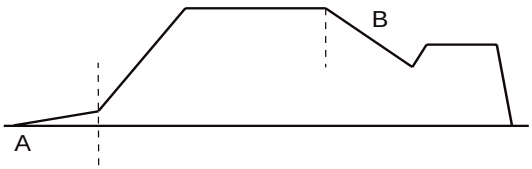
P2


PGMP002.EPS

PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99 h
Slopes: 50 - 1000 mbar/ min

Sealed plastic or flexible containers in e.g. blister pack

P3

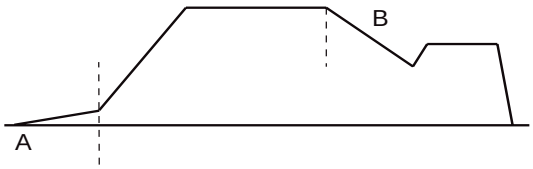


PGMP010.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Dry heat time.(A): 0 min - 99 h
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.(B): 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed plastic or flexible containers in e.g. blister pack

P4

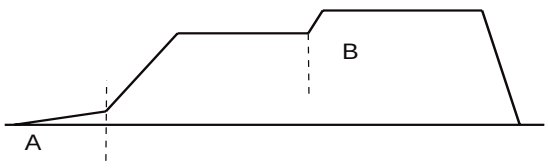


PGMP010.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Dry heat time.(A): 0 min - 99 h
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.(B): 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers in e.g. blister pack

P5



PGMP011.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Dry heat time.(A): 0 min - 99 h
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling temp.: 20 - 80 °C

Automatic leak rate test

P6

PGMP016.EPS

PARAMETER SETTINGS
Max. accepted leak rate:
13 mbar/10 min

RAX016

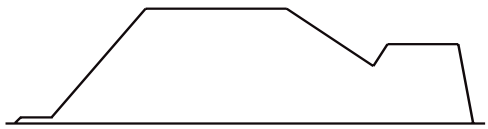
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination V2130

Sealed plastic or flexible containers

P1

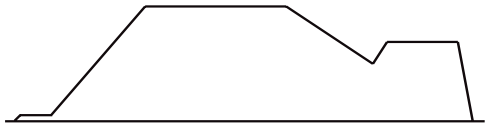


PGMP008.EPS

PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed plastic or flexible containers

P2

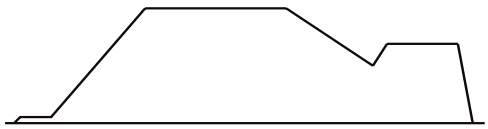


PGMP008.EPS

PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed plastic or flexible containers

P3

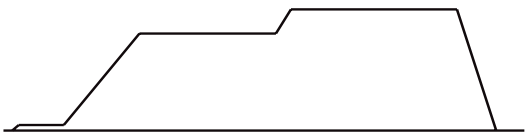


PGMP008.EPS

PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers

P4

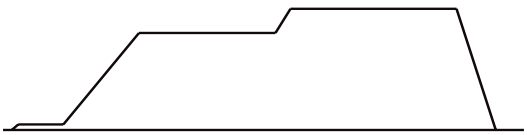


PGMP012.EPS

PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 0 - 2,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers

P5

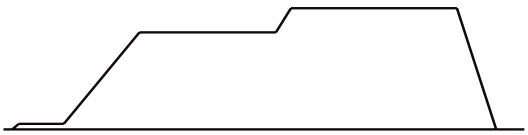


PGMP012.EPS

PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 0 - 2,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers

P6



PGMP012.EPS

PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 0 - 2,5 bar(a)
Cooling temp.: 20 - 80 °C

RAX009

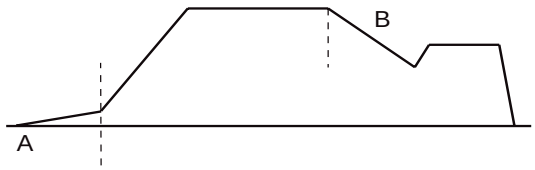
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination V2140

Sealed plastic or flexible containers in e.g. blister pack

P1

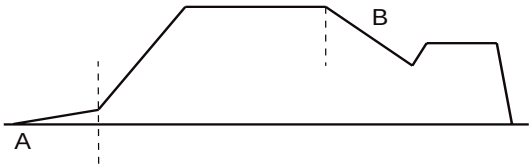


PGMP010.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.(B): 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed plastic or flexible containers in e.g. blister pack

P2

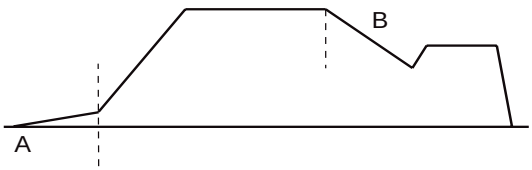


PGMP010.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.(B): 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed plastic or flexible containers in e.g. blister pack

P3

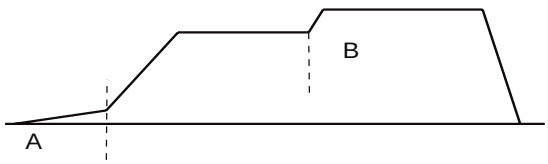


PGMP010.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.(B): 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers in e.g. blister pack

P4

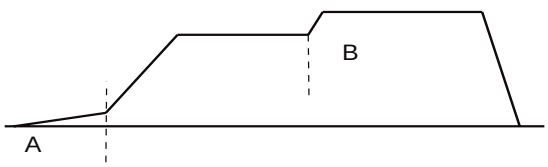


PGMP011.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers in e.g. blister pack

P5

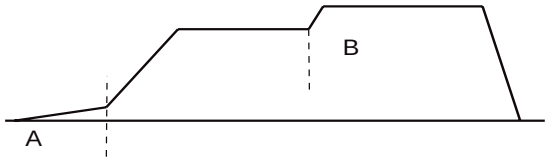


PGMP011.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers in e.g. blister pack

P6



PGMP011.EPS

PARAMETER RANGES
Dry heat temp.(A): 20 - 110 °C
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a
Cooling temp.: 20 - 80 °C

RAX010

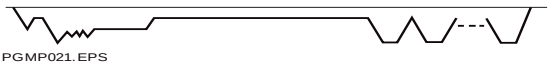
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination E2110

Heat sensitive products

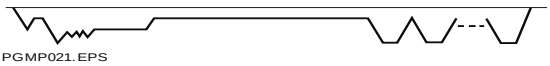
P1



PARAMETER RANGES
Ster. temp.: 40 - 55 °C
Ster time: 0 min - 99 h
Humidification time: 0 min - 99 h
Gas pressure: 200 - 1500 mbar
Degasing: 3 - 99 pulses

Heat sensitive products

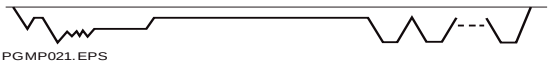
P2



PARAMETER RANGES
Ster. temp.: 40 - 55 °C
Ster time: 0 min - 99 h
Humidification time: 0 min - 99 h
Gas pressure: 200 - 1500 mbar
Degasing: 3 - 99 pulses

Heat sensitive products

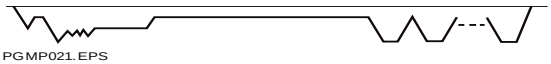
P3



PARAMETER RANGES
Ster. temp.: 40 - 55 °C
Ster time: 0 min - 99 h
Humidification time: 0 min - 99 h
Gas pressure: 200 - 1500 mbar
Degasing: 3 - 99 pulses

Heat sensitive products

P4



PARAMETER RANGES
Ster. temp.: 40 - 55 °C
Ster time: 0 min - 99 h
Humidification time: 0 min - 99 h
Gas pressure: 200 - 1500 mbar
Degasing: 3 - 99 pulses

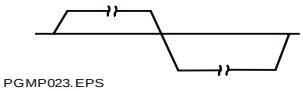
Separate degasing

P5

PARAMETER RANGES
Lower pressure: 50 - 200 mbar
Upper pressure: 500 - 900 mbar
Evacuation: 1 - 99 pulses

Automatic leak rate test

P6



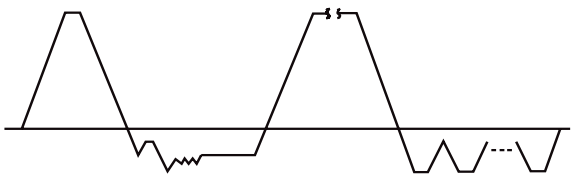
PARAMETER RANGES
Upper test pressure: 200 - 1500 mbar
Upper test time: 10 min - 99 h
Lower test pressure: 50 - 200 mbar
Lower test time: 2 min - 99 h
Max. accepted leak rate: 1 mbar/ min

GETINGE

Program combination E2120

Heat sensitive products

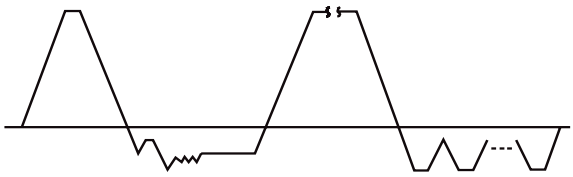
P1



PARAMETER RANGES
Ster. temp.: 40 - 55 °C
Ster time: 0 min - 99 h
Humidification time: 0 min - 99 h
Gas pressure: 1000 - 3700 mbar
Degasing: 3 - 99 pulses

Heat sensitive products

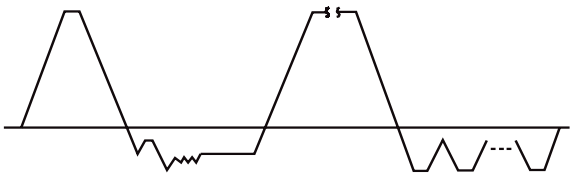
P2



PARAMETER RANGES
Ster. temp.: 40 - 55 °C
Ster time: 0 min - 99 h
Humidification time: 0 min - 99 h
Gas pressure: 1000 - 3700 mbar
Degasing: 3 - 99 pulses

Heat sensitive products

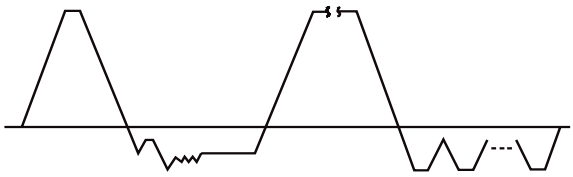
P3



PARAMETER RANGES
Ster. temp.: 40 - 55 °C
Ster time: 0 min - 99 h
Humidification time: 0 min - 99 h
Gas pressure: 1000 - 3700 mbar
Degasing: 3 - 99 pulses

Heat sensitive products

P4



PARAMETER RANGES
Ster. temp.: 40 - 55 °C
Ster time: 0 min - 99 h
Humidification time: 0 min - 99 h
Gas pressure: 1000 - 3700 mbar
Degasing: 3 - 99 pulses

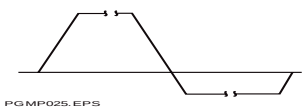
Separate degasing

P5

PARAMETER RANGES
Lower pressure: 50 - 200 mbar
Upper pressure: 500 - 900 mbar
Evacuation: 1 - 99 pulses

Automatic leak rate test

P6



PARAMETER RANGES
Upper test press.: 1000 - 3700 mbar
Upper test time: 10 min 99 h
Lower test press.: 50 - 200 mbar
Lower test time: 2 min - 99 h
Max accepted leak rate: 1 mbar / min

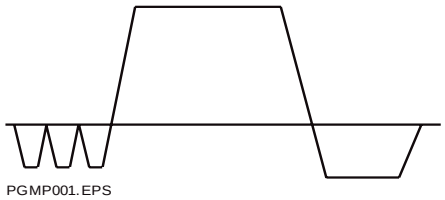
RAX012

GETINGE

Program combination P2100

Utensils, glassware, textiles, plastic and rubber products

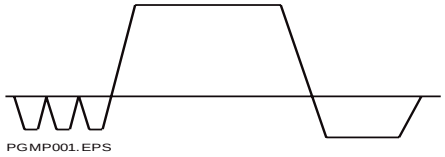
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Textiles, plastic and rubber products

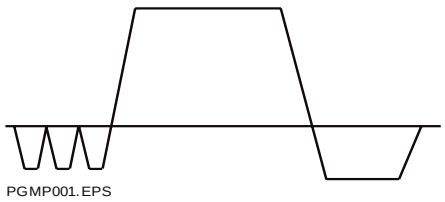
P2



PARAMETER SETTINGS
Ster. temp.: 121 °C
Ster. time: 20 min
Drying vacuum time: 5 min

Utensils, glassware, textiles

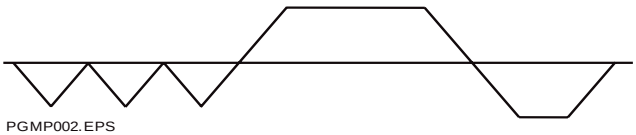
P3



PARAMETER SETTINGS
Ster. temp.: 135 °C
Ster. time: 7 min
Drying vacuum time: 5 min

Filter

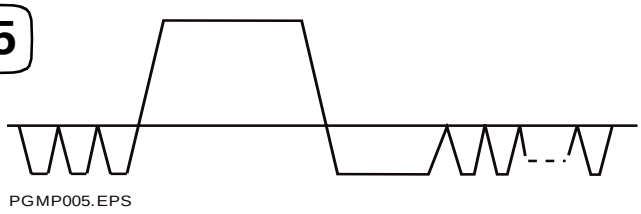
P4



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar / min

Rubber stoppers, ampoules

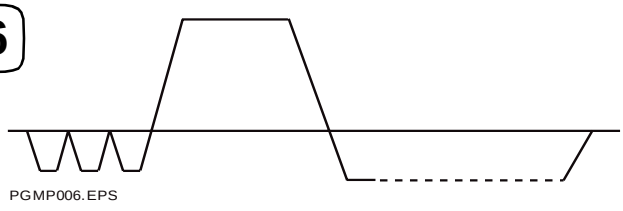
P5



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Drying: 0 - 10 pulses

Automatic leak rate test

P6



PARAMETER SETTINGS
Temp: 13 °C
Time: 7 min
Max accepted leak rate
13 mbar / 10 min

RAX013

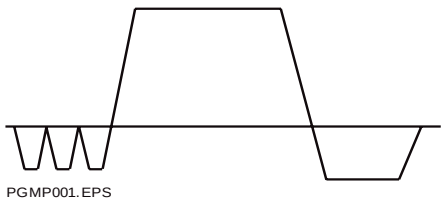
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination P2200

Utensils, glassware, empty containers

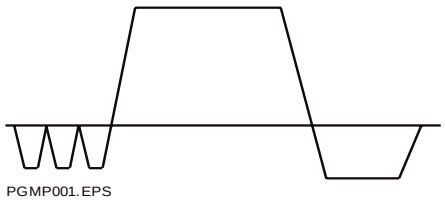
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Textiles, plastic and rubber products

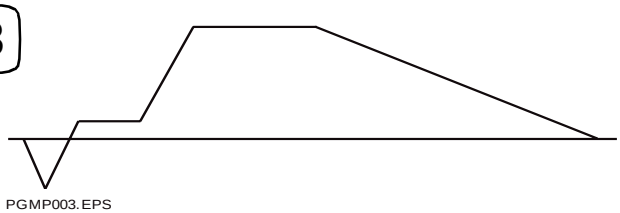
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Liquids in open or vented containers

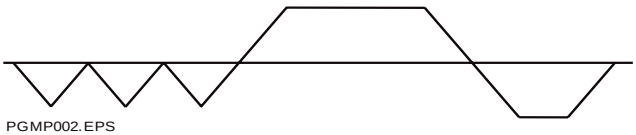
P3



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h

Filter

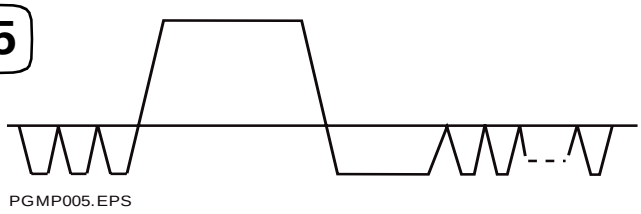
P4



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar / min

Rubber stoppers, ampoules

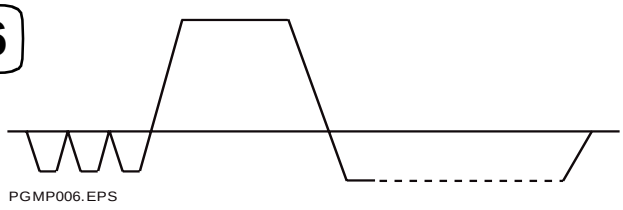
P5



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Drying: 0 - 10 pulses

Automatic leak rate test

P6



PARAMETER SETTINGS
Temp: 13 °C
Time: 7 mi
Max accepted leak rate
13 mbar / 10 mi

RAX014

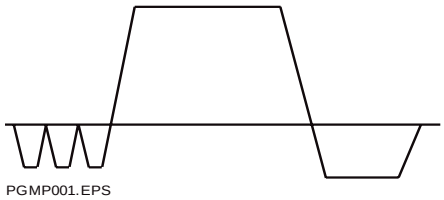
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination P2220

Utensils, glassware, empty containers, textiles, plastic, rubber

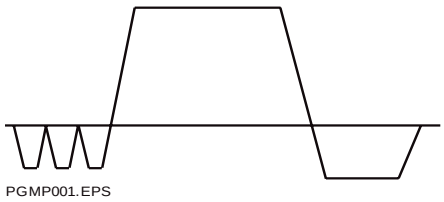
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Macrolon cages

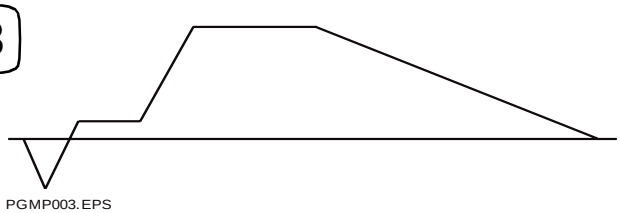
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Liquids in open or vented containers

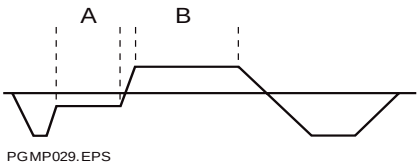
P3



PARAMETER SETTINGS
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h

Fodder

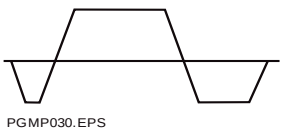
P4



PARAMETER RANGES
Hold temp. (A): 50 - 100 °C
Hold time (A): 0 min - 99 h
Hold temp. (B): 50 - 135 °C
Hold time (B): 0 min - 99 h
Drying vacuum time: 0 min - 99
Drying slope: 50 - 1000 mbar / min

Bedding

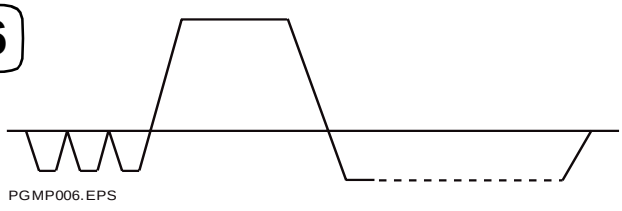
P5



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Drying vacuum: 1 - 10 pulses

Automatic leak rate test

P6



PARAMETER SETTINGS
Temp: 13 °C
Time: 7 mi
Max accepted leak rate
13 mbar / 10 mi

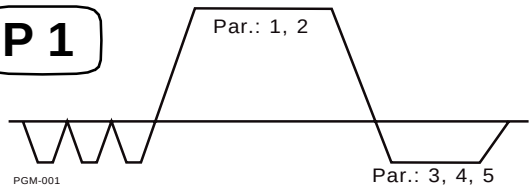
RAX015

Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

Program combination B2001

Porous load, wrapped instruments

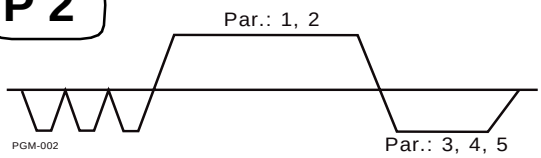
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

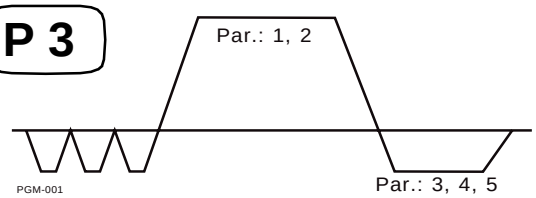
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heavy load, wrapped instruments

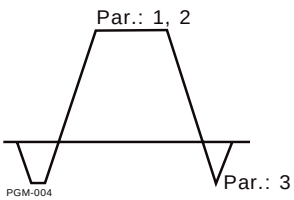
P 3



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3 - 20 min	7 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	15 min	_____

Rapid process for single, open instrument

P 4

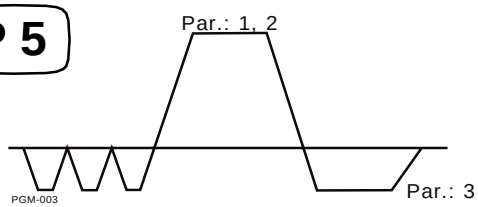


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 5

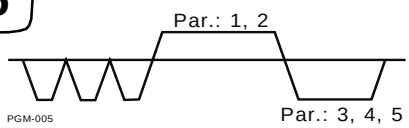


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Disinfection

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

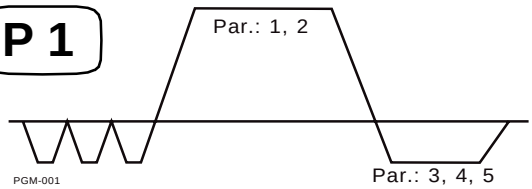
RAX023

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2002

Porous load, wrapped instruments

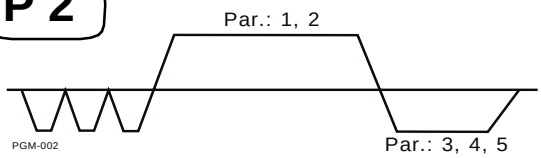
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

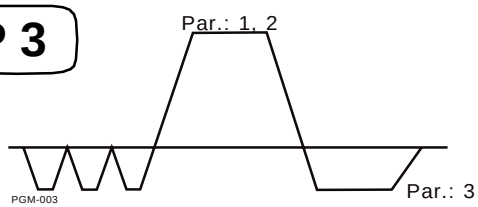
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

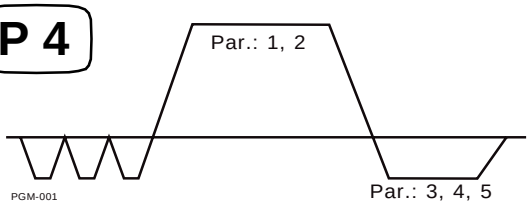


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

General process for solid material

P 4

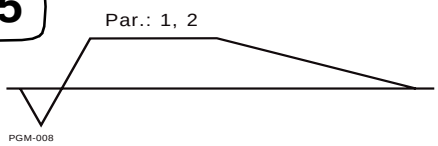


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	_____
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Cool liquids in open or vented containers

P 5

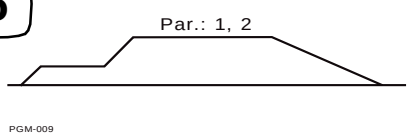


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Warm liquids in open or vented containers

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

RAX021

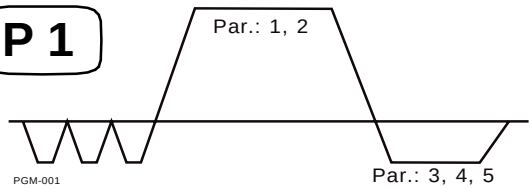
Liquids must be processed with appropriate liquid programs only.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2100

Porous load, wrapped instruments

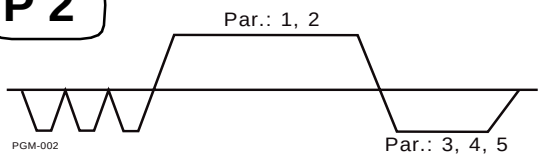
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

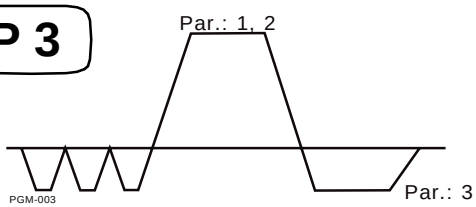
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

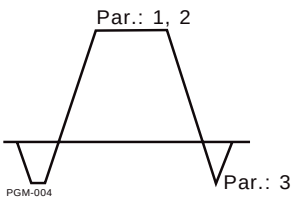


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

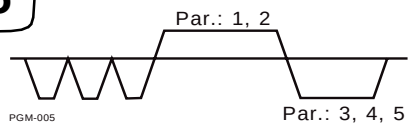


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

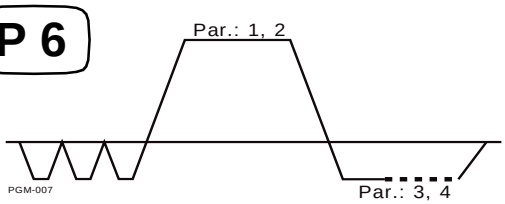


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

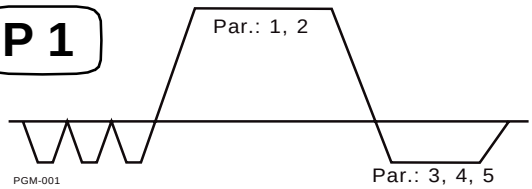
RAX017

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2101

Porous load, wrapped instruments

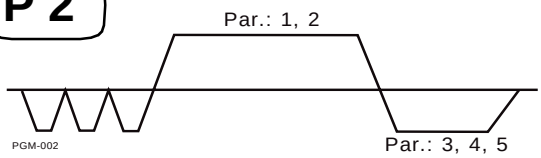
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

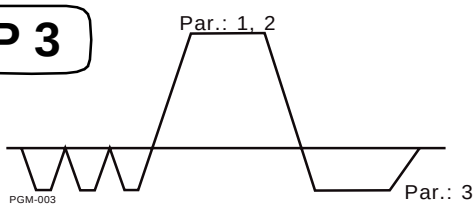
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

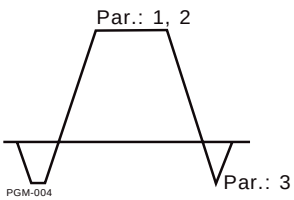


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

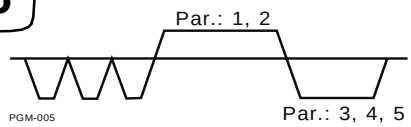


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

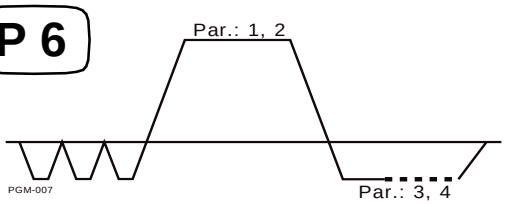


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	_____

RAX018

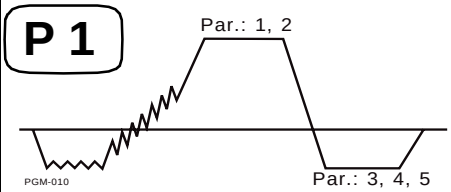
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2102

Porous load, wrapped instruments

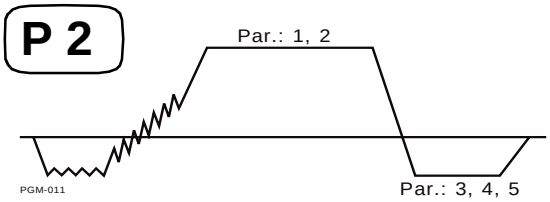
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

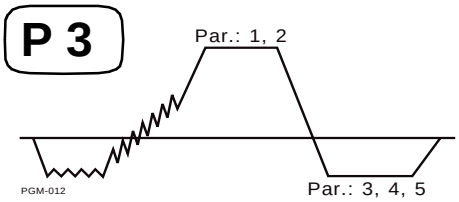
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	16 min	_____
3. Postvacuum time	0 - 90 min	7 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

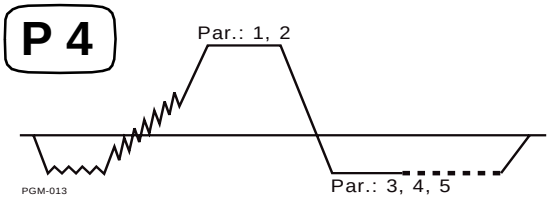


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	7 min	_____

Automatic leak test

P 4



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	12 °C	_____
2. Time	3 - 90 min	16 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	

RAX019

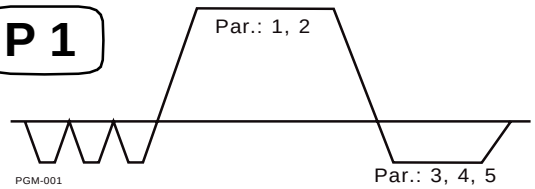
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2103

Porous load, wrapped instruments

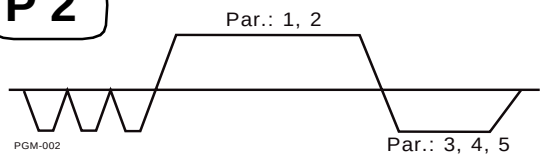
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

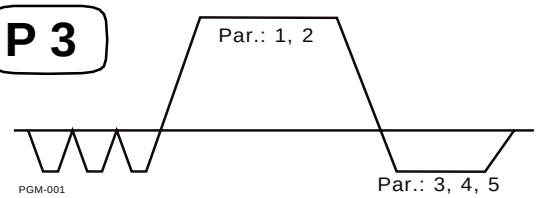
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heavy load, wrapped instruments

P 3

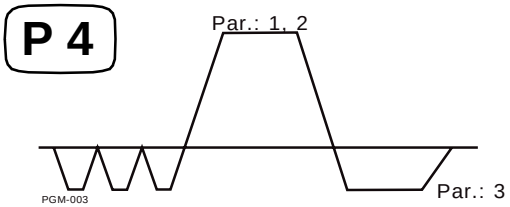


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	_____
2. Sterilizing time	3 - 20 min	7 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	15 min	_____

Password required!

Bowie / Dick, open instruments

P 4

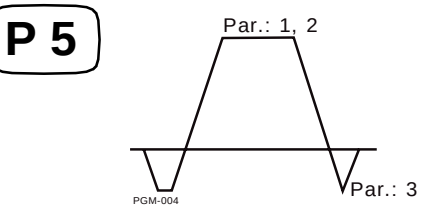


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Password required!

Rapid process for single, open instrument

P 5

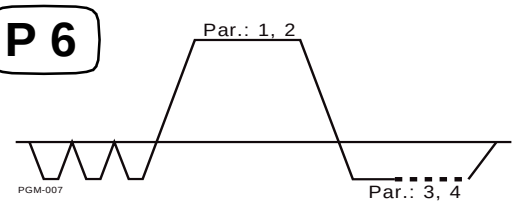


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Password required!

Automatic leak test

P 6



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	_____

Password required!

RAX020

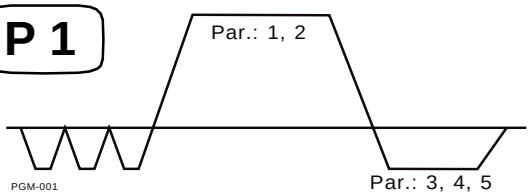
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2201

Heat sensitive material, rubber, plastic, porous load

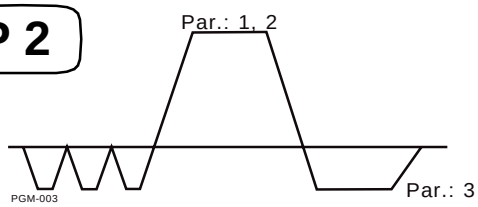
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 2

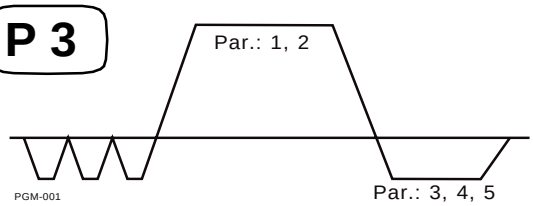


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

General process for solid material

P 3

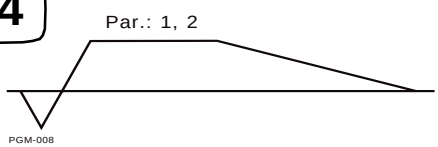


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	_____
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Cool liquids in open or vented containers

P 4

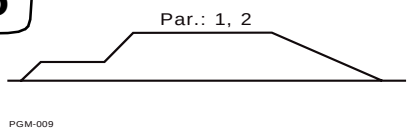


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Warm liquids in open or vented containers

P 5

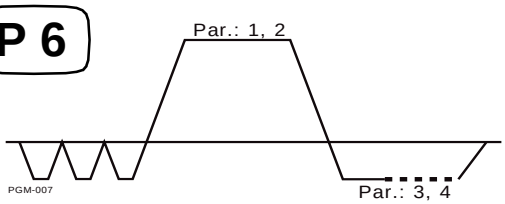


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
1. Time	3 - 20 min	7 min	_____
1. Postvacuum time	5 - 90 min	5 min	_____
1. Stabilizing time	10 - 90 min	10 min	_____
1. Test time	10 min	10 min	_____

RAX022

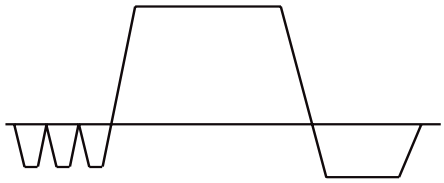
Liquids must be processed with appropriate liquid programs only.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination V2111

Utensils, glassware, textiles

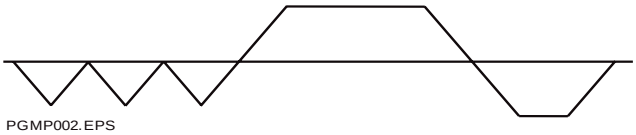
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99

Filter

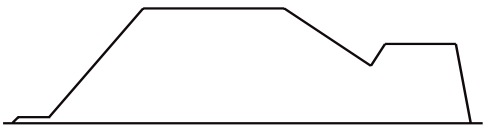
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99
Slopes: 50 - 1000 mbar/ mi

Sealed plastic or flexible containers

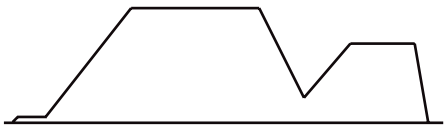
P3



PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Agar in open containers

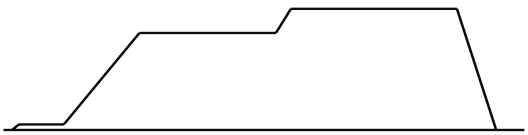
P4



PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Sealed glass or rigid containers

P5



PARAMETER RANGES
Ster. temp.: 100 - 124 °C
Overshoot temp.: 0 - 4 °C
Ster. time: 0 min - 99 h
Support press. add: 0 - 1,5 bar(a)
Cooling press.: 1 - 3,5 bar(a)
Cooling temp.: 20 - 80 °C

Automatic leak rate test

P6

PARAMETER SETTINGS
Max. accepted leak rate:
13 mbar/10 min

RAX024

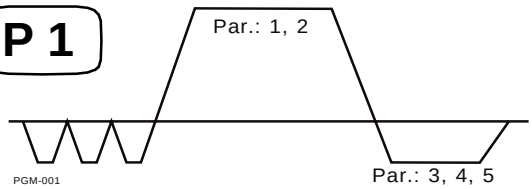
Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

GETINGE

Program combination B2010

Porous load, wrapped instruments

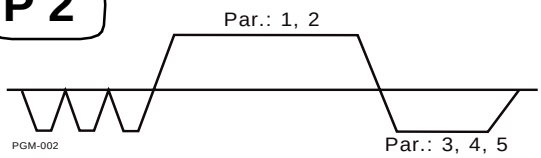
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

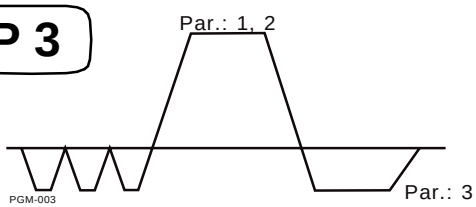
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

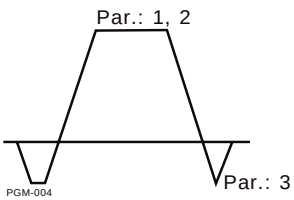


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

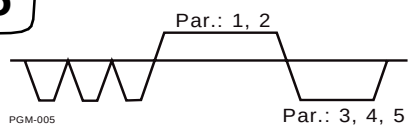


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

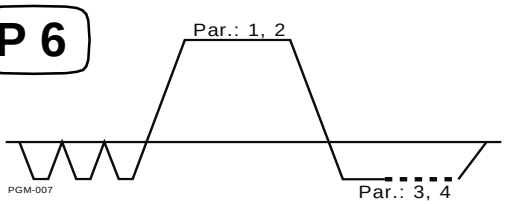


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

RAX026

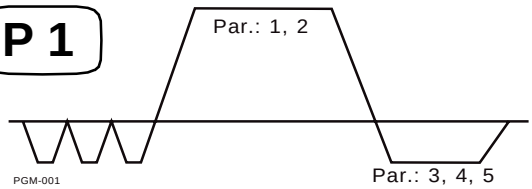
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2110

Porous load, wrapped instruments

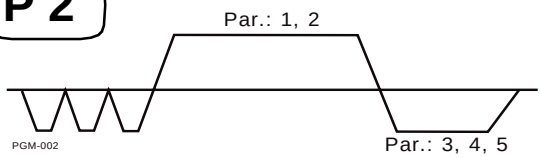
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

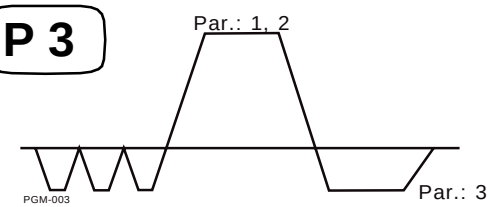
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

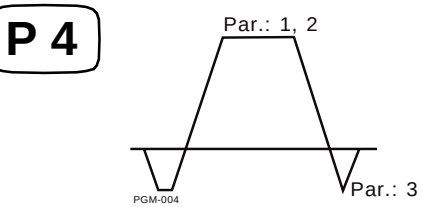


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

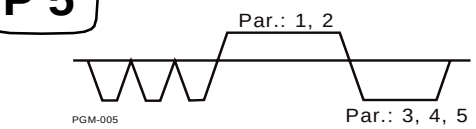


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

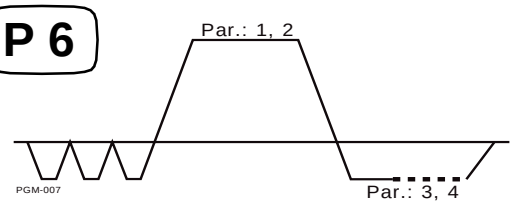


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

RAX027

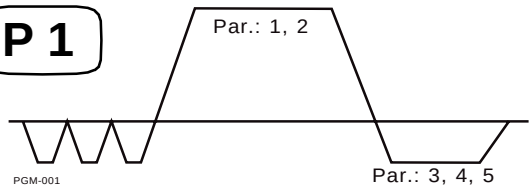
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2011

Porous load, wrapped instruments

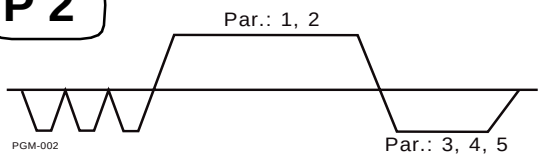
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

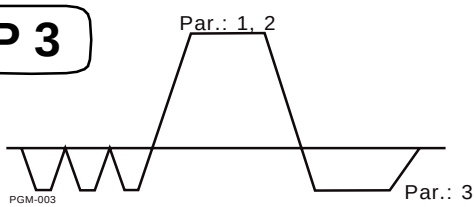
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

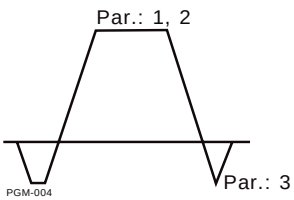


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

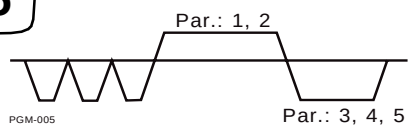


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

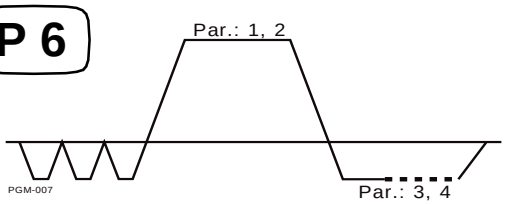


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time.	10 min	10 min	_____

RAX029

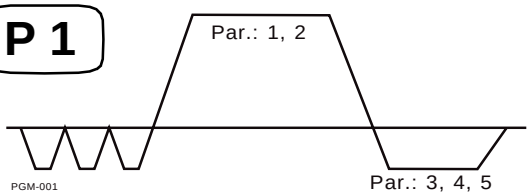
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2012

Heat sensitive material, rubber, plastic, porous load

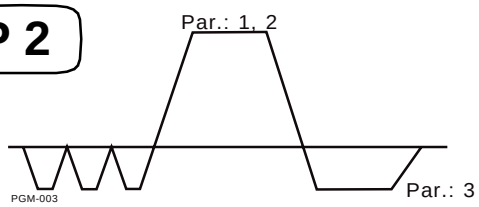
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 2

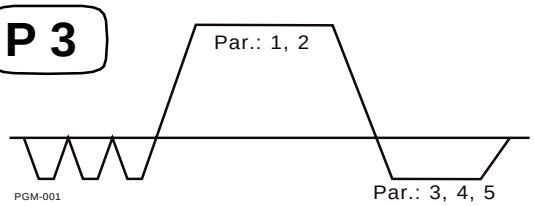


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

General process for solid material

P 3

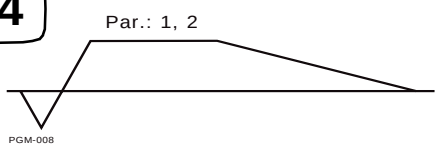


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100°C	13 °C	_____
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Cool liquids in open or vented containers

P 4

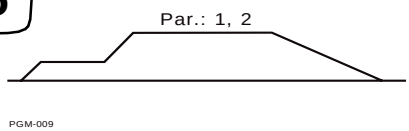


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Warm liquids in open or vented containers

P 5

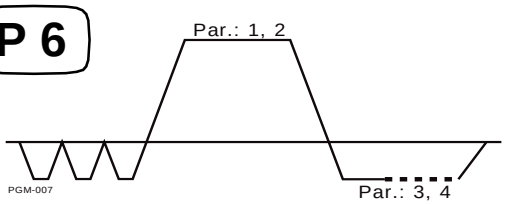


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 90 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

RAX028

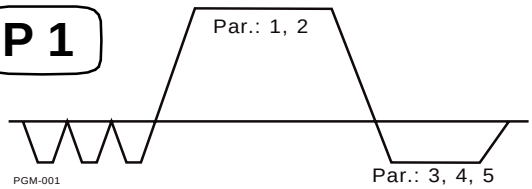
Liquids must be processed with appropriate liquid programs only.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2111

Porous load, wrapped instruments

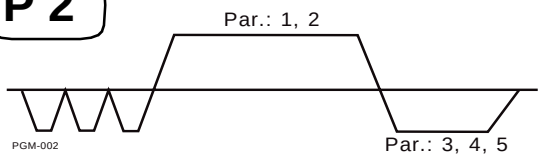
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

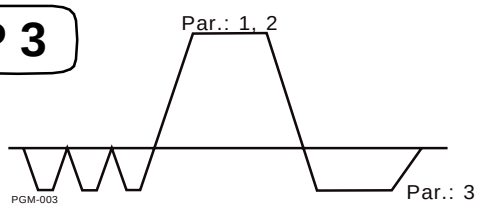
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

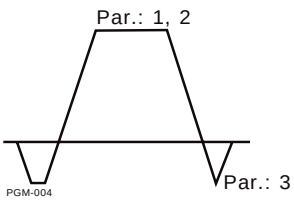


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

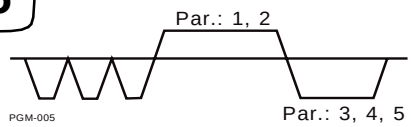


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

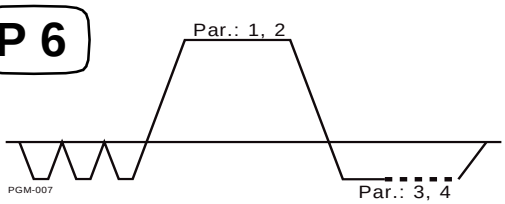


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

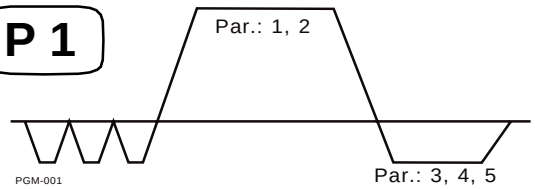
RAX030

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2113

Porous load, wrapped instruments

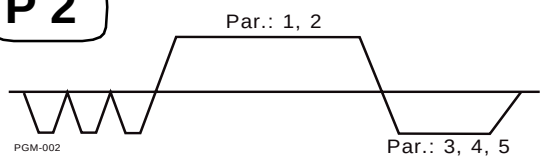
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

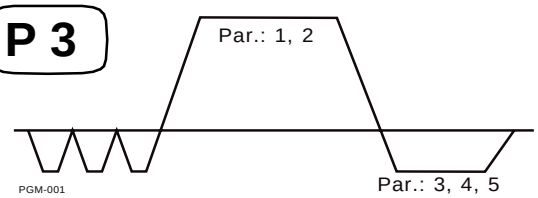
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heavy load, wrapped instruments

P 3

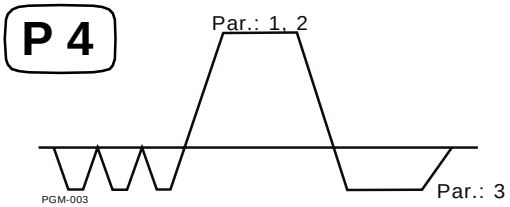


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	_____
2. Sterilizing time	3 - 20 min	7 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	15 min	_____

Password required!

Bowie / Dick, open instruments

P 4

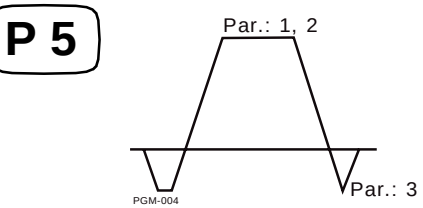


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Password required!

Rapid process for single, open instrument

P 5

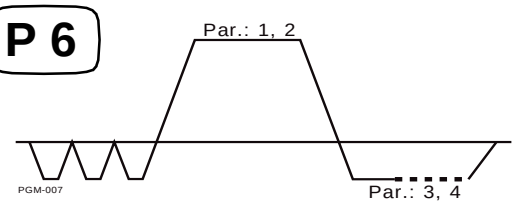


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Password required!

Automatic leak test

P 6



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 90 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	_____

Password required!

RAX031

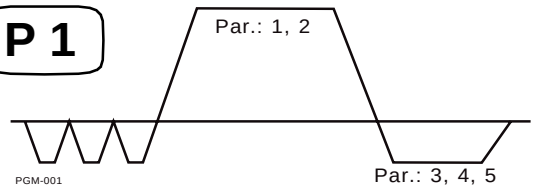
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2114

Porous load, wrapped instruments

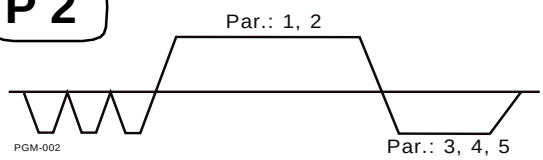
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

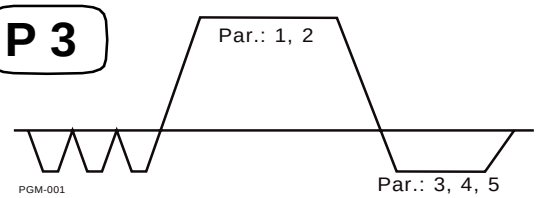
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heavy load, wrapped instruments

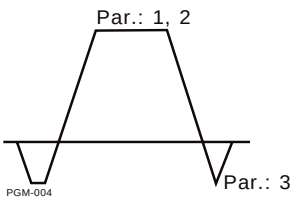
P 3



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3 - 20 min	7 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
4. Postpuls steam	0 - 90 min	20 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Rapid process for single, open instrument

P 4

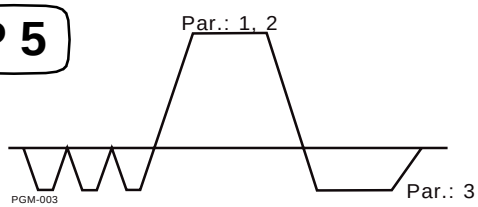


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	_____
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Bowie / Dick

P 5

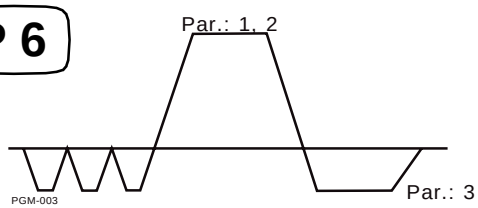


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	_____
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Disinfection

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	134 - 121 °C	13 °C	_____
2. Disinfection time	3 - 90 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Postpuls steam	10 - 90 min	10 min	_____
5. Postpuls air	10 mi	10 min	_____

RAX032

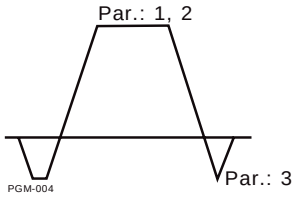
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2114

Rapid process for single, open instrument

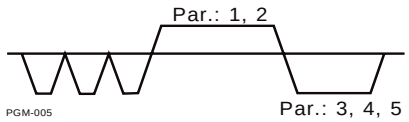
P 7



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Disinfection

P 8



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 min	0 min	

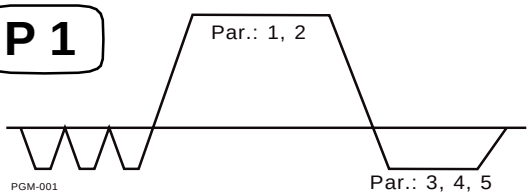
RAX032

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2211

Porous load, wrapped instruments

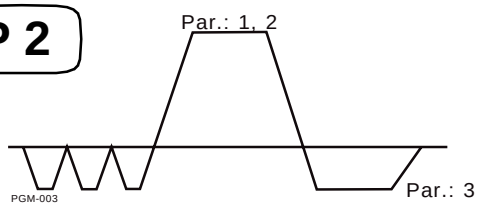
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 2

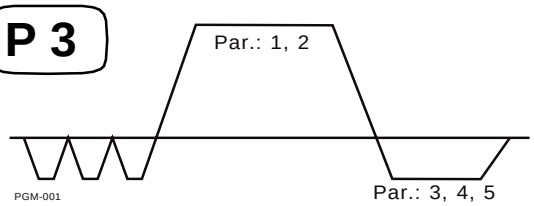


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

General process for solid material

P 3

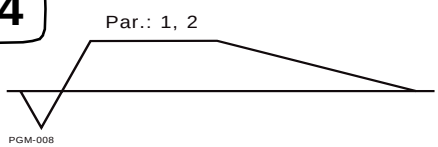


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	13 °C	_____
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Cool liquids in open or vented containers

P 4

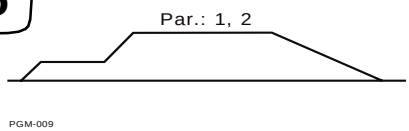


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Warm liquids in open or vented containers

P 5

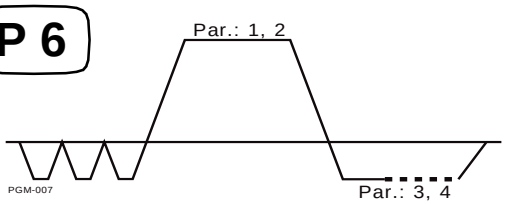


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	12 °C	_____
2. Time	3 - 90 min	20 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 min	10 min	_____

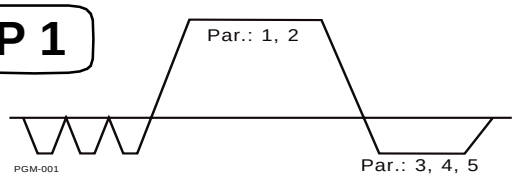
RAX033

Liquids must be processed with appropriate liquid programs only.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination page 1/2 B 2511

Porous load, wrapped instruments

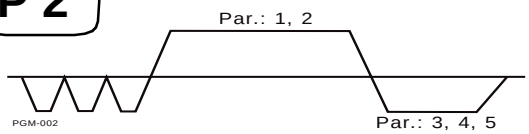
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temperatur:	134°C	134°C	
2. Steril.time:	3 - 7 min	7 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

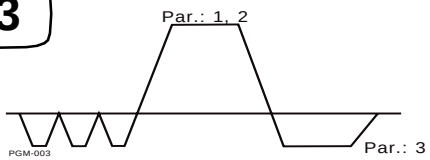
P 2



1. Steril.temperatur:	121°C	121°C	
2. Steril.time:	16 - 20 min	20 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Bowie / Dick

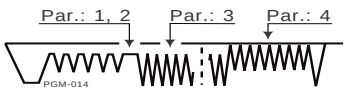
P 3



1. Steril.temperatur:	134 - 121°C	134°C	
2. Steril.time:	3,5 - 15 min	3,5 min	_____
3. Postvacuum time:	0 - 90 min	3 min	_____

Very heat sensitive goods 80°C

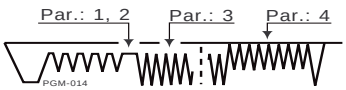
P 4



1. Steril.temperatur:	80°C	80°C	
2. Steril.time:	10 min	10 min	_____
3. Postpuls steam:	20 - 50	20	_____
4. Postpuls air:	8	8	

Very heat sensitive goods 65°C

P 5



1. Steril.temperatur:	65°C	65°C	
2. Steril.time:	30 min	30 min	_____
3. Postpuls steam:	50 - 70	50	_____
4. Postpuls air:	8	8	

Automatic leak test

P 6

1. Test time:	10 min	10 min	

RAX034

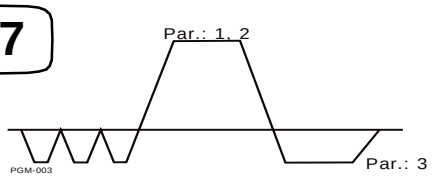
Hazardous waste and explosive materials must not be processed in this sterilize

GETINGE

Program combination page 2/2 B 2511

Open instruments

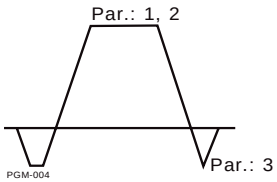
P 7



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temperatur:	134 - 121°C	134°C	_____
2. Steril.time:	3,5 - 15 min	3,5 min	_____
3. Postvacuum time:	0 - 90 min	3 min	_____

Rapid process for single, open instrument

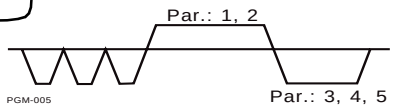
P 8



1. Steril.temperatur:	134°C	134°C	
2. Steril.time:	3 - 90 min	3,5 min	_____
3. Postvacuum time:	0 - 90 min	0 min	_____

Disinfection

P 9



1. Disinf.temperatur:	105°C	105°C	
2. Disinf.time:	5 - 90 min	5 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Chamber cleaning

P 10

1. Cleaning pulses:	0 - 20	10	_____

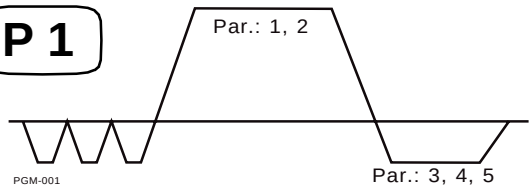
RAX034

Hazardous waste and explosive materials must not be processed in this sterilize

Program combination B2115

Porous load, wrapped instruments

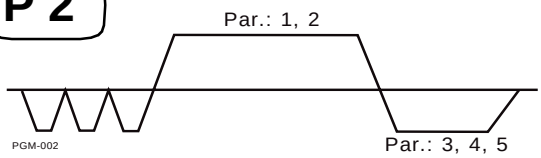
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

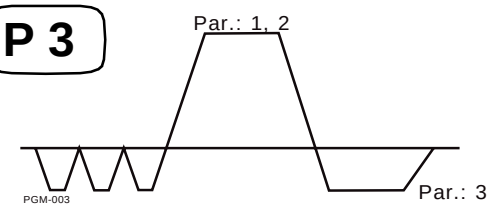
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

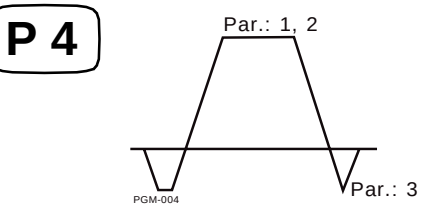


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

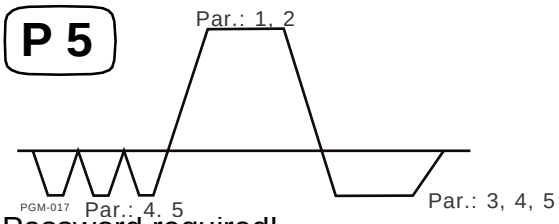


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

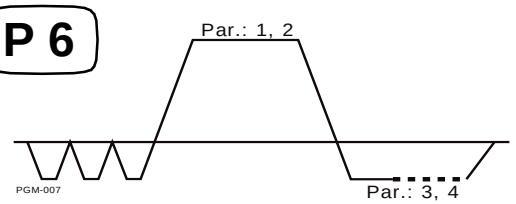


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Slopes	50 mbar - 5 bar	0.5 bar/min	_____
5. Postpuls air	50 mbar - 5 bar	0.25 bar/mi	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

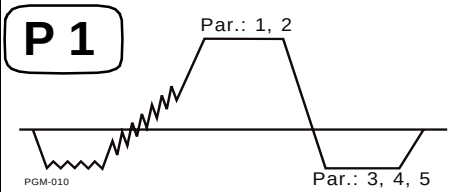
RAX035

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2112

Porous load, wrapped instruments

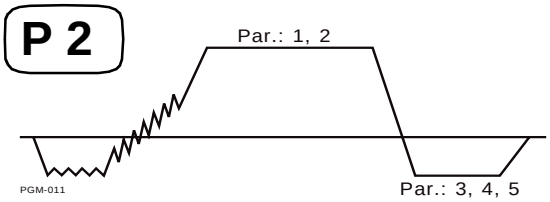
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	5 min	_____
3. Postvacuum time	0 - 90 min	7 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

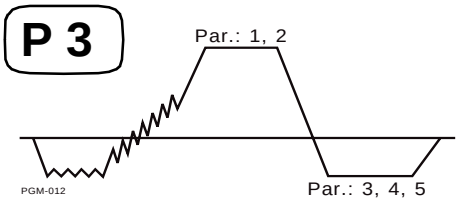
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	16 min	_____
3. Postvacuum time	0 - 90 min	7 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

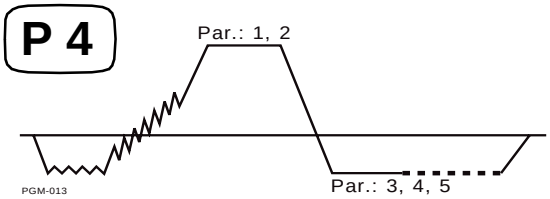


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	7 min	_____

Automatic leak test

P 4



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	12 °C	_____
2. Time	3 - 90 min	16 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	

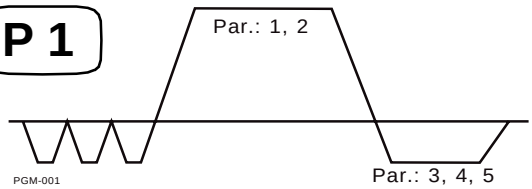
RAX036

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2105

Porous load, wrapped instruments

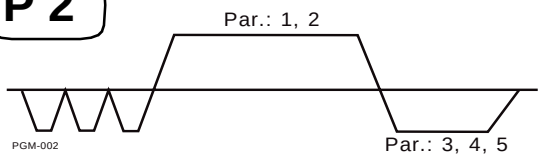
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

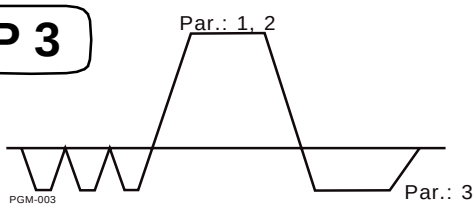
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

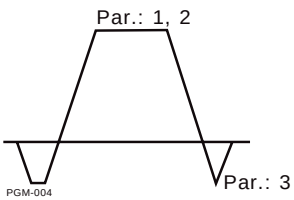


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

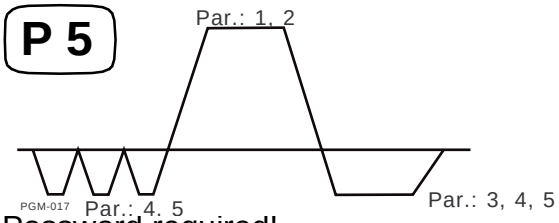


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

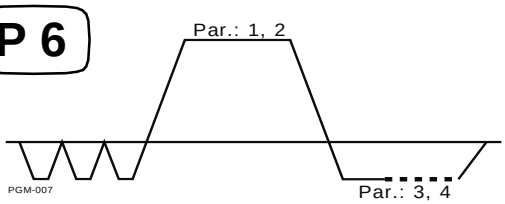


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Slopes	50 mbar - 5 bar	0.5 bar/min	_____
5. Postpuls air	50 mbar - 5 bar	0.25 bar/mi	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

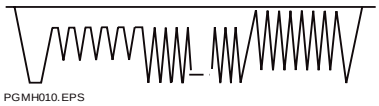
RAX038

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination F 2951

Heat sensitive material

P 1

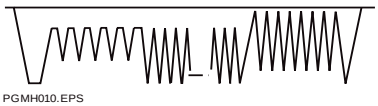


80°C

PARAMETER	RANGE	DELIVERED	ACTUAL
5. Steril.temp.	80 °C	80°C	
6. Steril.time.	10 min.	10 min.	
7. Vacuum puls.	20	20	
8. Air puls.	8	8	
9. Formaldehyd puls.	10	10	

Heat sensitive material

P 2



65°C

1. Steril.temp.	65 °C	65 °C	
2. Steril.time.	30 min.	30 min.	
3. Vacuum puls.	50	50	
4. Air puls.	8	8	
5. Formaldehyd puls.	10	10	

Chamber cleaning

P 3

1. Steril.temp.	12 °C	12 °C	
2. Cleaning puls.	9	9	

Password required

Automatic leak test

P 4

Max accepted leakage rate

13 mbar / 10 min

Password required

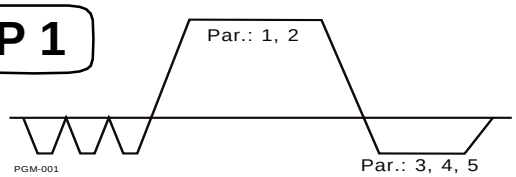
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

RAX039

Program combination B2010

Porous load, wrapped instruments

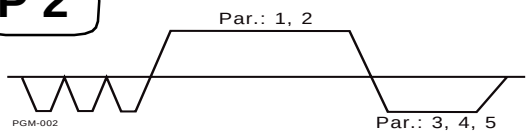
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

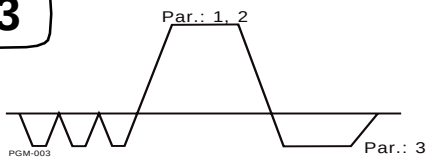
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

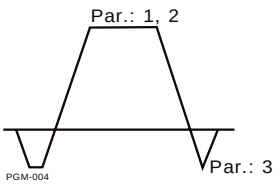


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

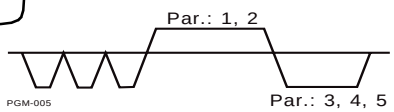


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

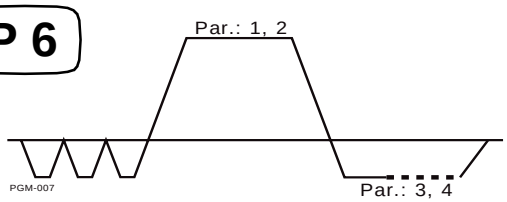


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

RAX041

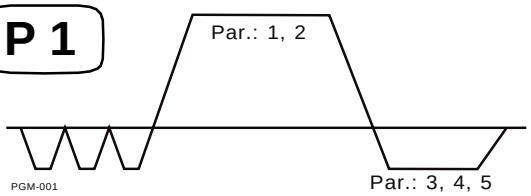
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2012

Heat sensitive material, rubber, plastic, porous load

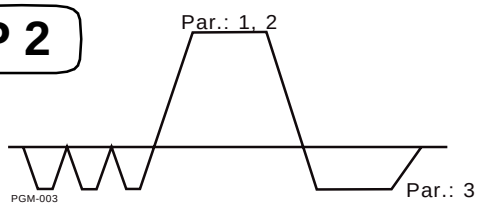
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 2

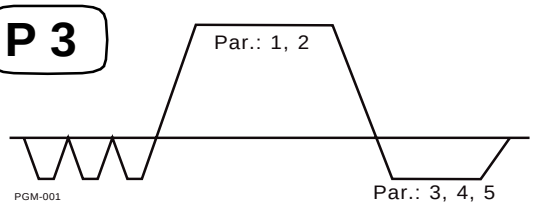


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

General process for solid material

P 3

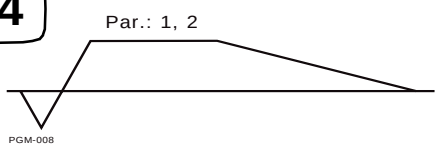


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100°C	13 °C	_____
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Cool liquids in open or vented containers

P 4

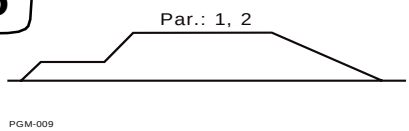


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Warm liquids in open or vented containers

P 5

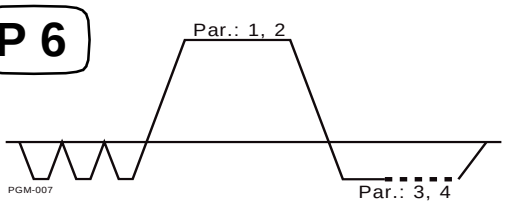


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 90 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

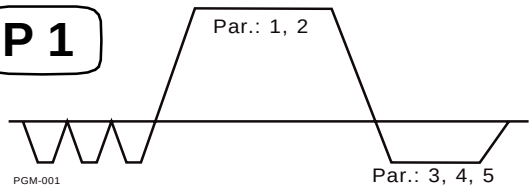
RAX043

Liquids must be processed with appropriate liquid programs only.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2011

Porous load, wrapped instruments

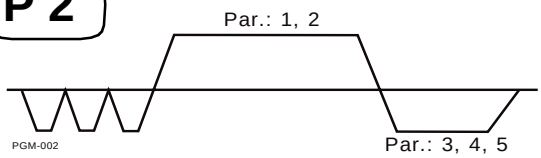
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

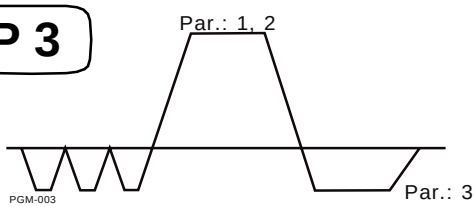
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

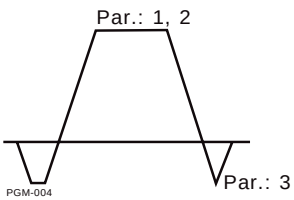


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

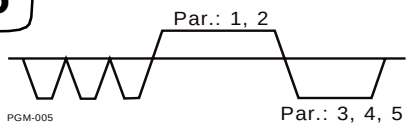


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

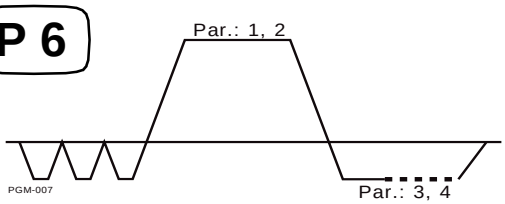


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time.	10 min	10 min	

RAX044

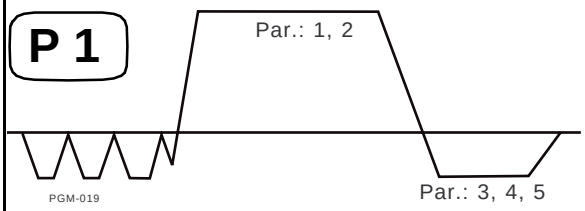
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2111

Porous load, wrapped instruments

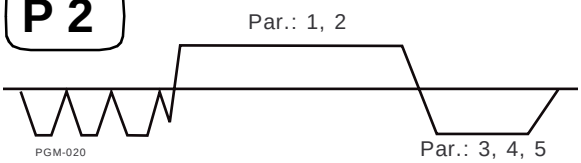
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

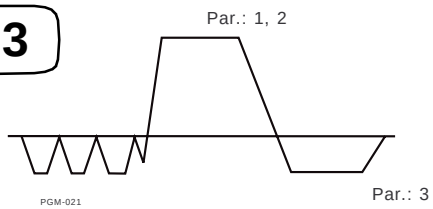
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

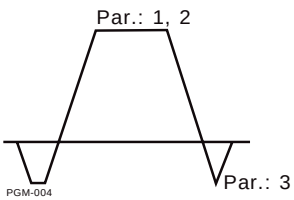


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	
2. Sterilizing time	0 - 15 min	*) min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
***) Steriltid GE 2606-2609**		**1 min**	
***) Steriltid GE 2612-2618**		**0,25 min**	

Rapid process for single, open instrument

P 4

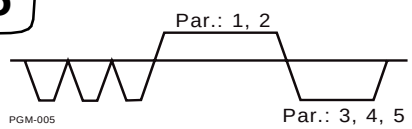


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

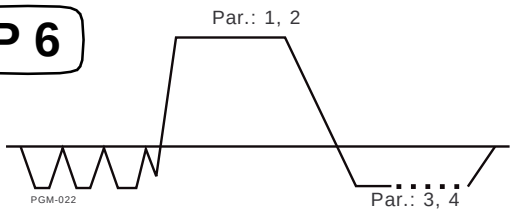


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 min	10 min	

RAX045

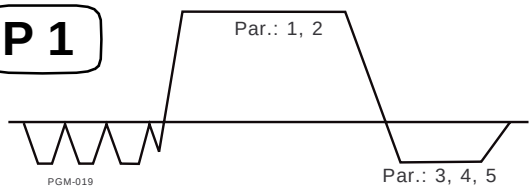
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2113

Porous load, wrapped instruments

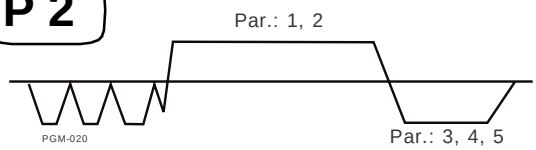
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

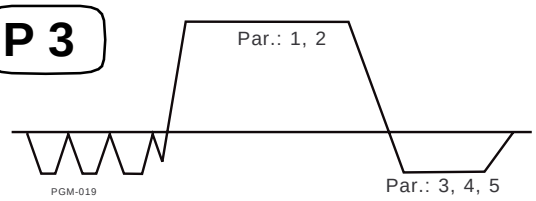
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heavy load, wrapped instruments

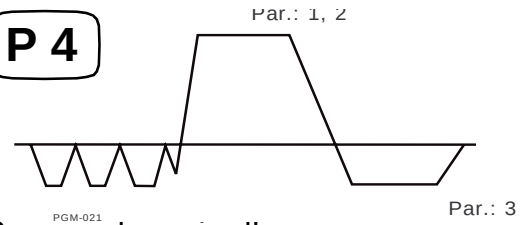
P 3



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	_____
2. Sterilizing time	3 - 20 min	7 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	15 min	_____

Bowie / Dick

P 4

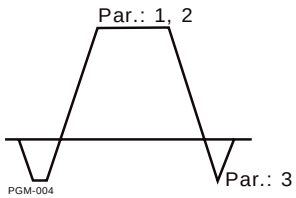


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	0 - 15 min	*) min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
***) Steriltid GE 2606-2609**		**1 min**	
***) Steriltid GE 2612-2618**		**0,25 min**	

Rapid process for single, open instrument

P 5

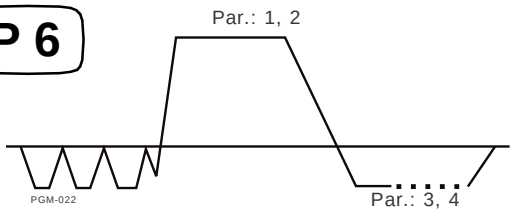


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 90 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	_____

RAX046

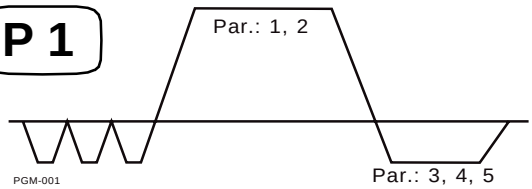
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2115

Porous load, wrapped instruments

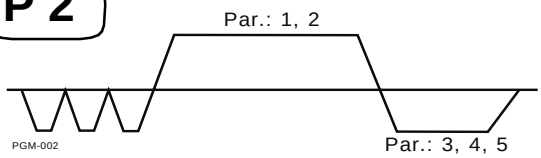
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

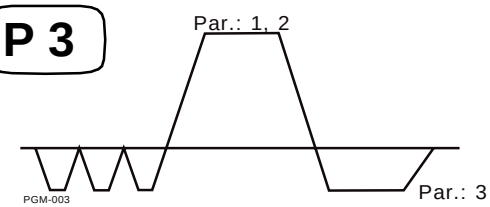
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick

P 3

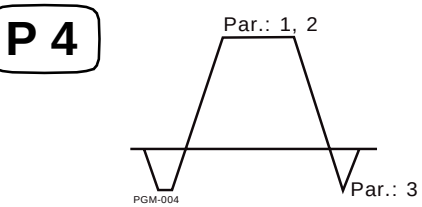


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	0 - 15 min	*) min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
***) Steriltid GE 2606-2609**		**1 min**	
***) Steriltid GE 2612-2618**		**0,25 min**	

Rapid process for single, open instrument

P 4

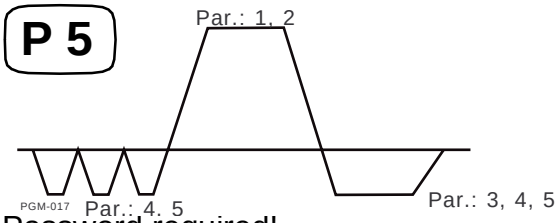


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

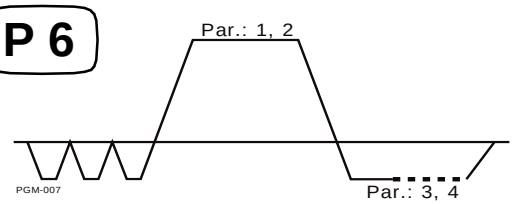


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Slopes	50 mbar - 5 bar	0.5 bar/min	_____
5. Postpuls air	50 mbar - 5 bar	0.25 bar/mi	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

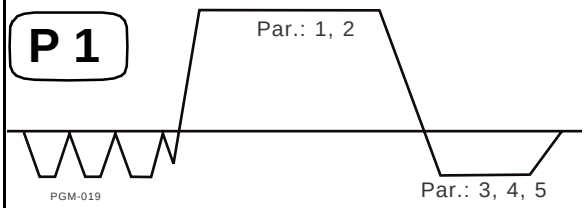
RAX048

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2211

Porous load, wrapped instruments

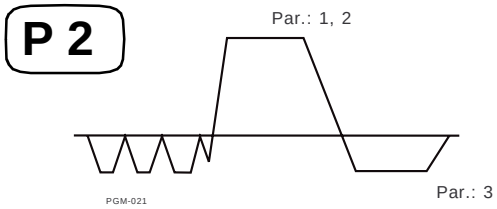
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick

P 2

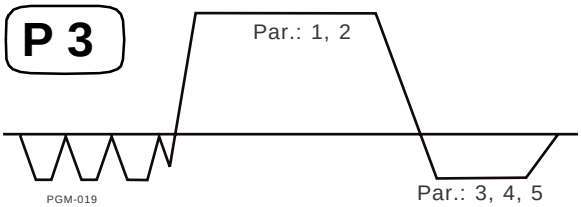


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	0 - 15 min	*) min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
***) Steriltid GE 2606-2609**		**1 min**	
***) Steriltid GE 2612-2618**		**0,25 min**	

Password required!

General process for solid material

P 3

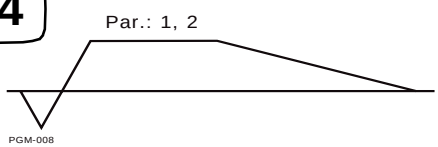


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	13 °C	_____
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Password required!

Cool liquids in open or vented containers

P 4

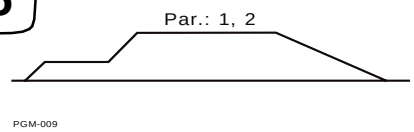


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Password required!

Warm liquids in open or vented containers

P 5

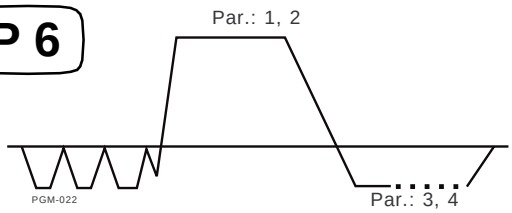


PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Password required!

Automatic leak test

P 6



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 90 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 min	10 min	_____

Password required!

RAX033

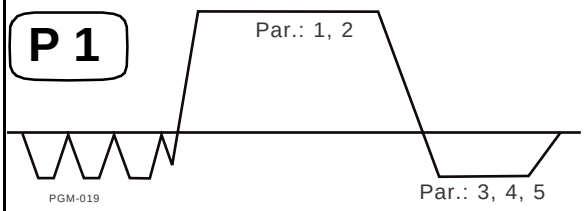
Liquids must be processed with appropriate liquid programs only.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination page 1/2 B 2511

Porous load, wrapped instruments

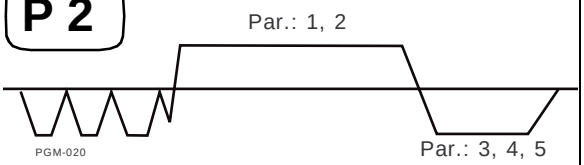
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temperatur:	134°C	134°C	
2. Steril.time:	3 - 7 min	7 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

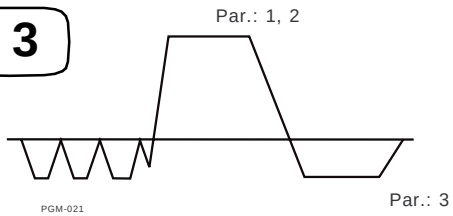
P 2



1. Steril.temperatur:	121°C	121°C	
2. Steril.time:	16 - 20 min	20 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Bowie / Dick

P 3

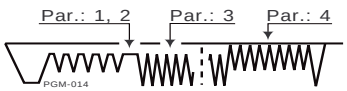


Password required!

1. Steril.temperatur:	134 - 121°C	134°C	_____
2. Steril.time:	0 - 15 min	*) min	_____
3. Postvacuum time:	0 - 90 min	3 min	_____
*) GE 2606-2609	1 min		
*) GE 2612-2618	0,25 min		

Very heat sensitive goods 80°C

P 4

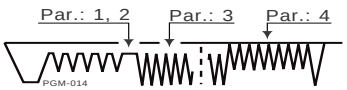


Password required!

1. Steril.temperatur:	80°C	80°C	
2. Steril.time:	10 min	10 min	_____
3. Postpuls steam:	20 - 50	20	_____
4. Postpuls air:	8	8	

Very heat sensitive goods 65°C

P 5



Password required!

1. Steril.temperatur:	65°C	65°C	
2. Steril.time:	30 min	30 min	_____
3. Postpuls steam:	50 - 70	50	_____
4. Postpuls air:	8	8	

Automatic leak test

P 6

Password required!

1. Test time:	10 min	10 min	

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

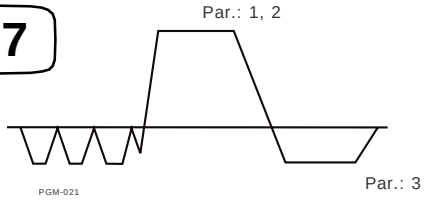
RAX050

GETINGE

Program combination page 2/2 B 2511

Open instruments

P 7

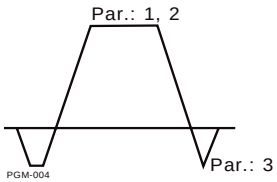


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temperatur:	134 - 121°C	134°C	_____
2. Steril.time:	3,5 - 15 min	3,5 min	_____
3. Postvacuum time:	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 8

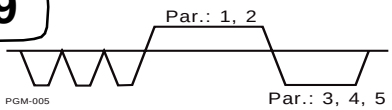


Password required!

1. Steril.temperatur:	134°C	134°C	
2. Steril.time:	3 - 90 min	3 min	_____
3. Postvacuum time:	0 - 90 min	0 min	_____

Disinfection

P 9



Password required!

1. Disinf.temperatur:	105°C	105°C	
2. Disinf.time:	5 - 90 min	5 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Chamber cleaning

P 10

Password required!

1. Cleaning pulses:	10 - 20	10	_____

RAX050

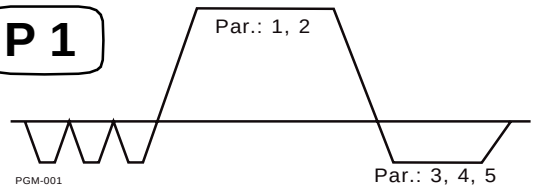
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2001

Porous load, wrapped instruments

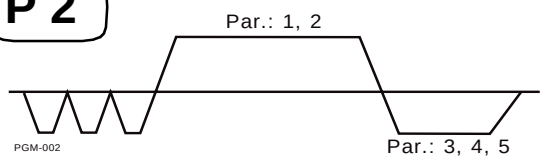
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

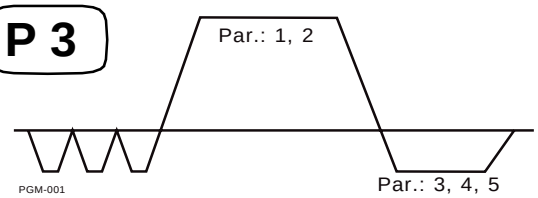
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heavy load, wrapped instruments

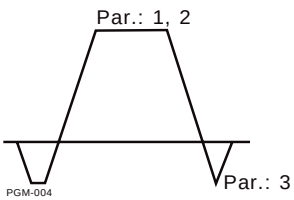
P 3



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3 - 20 min	7 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	15 min	_____

Rapid process for single, open instrument

P 4

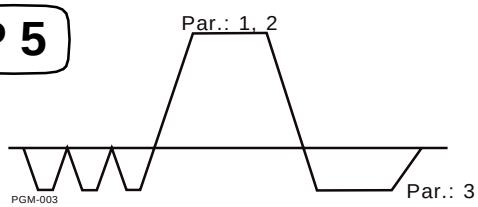


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 5

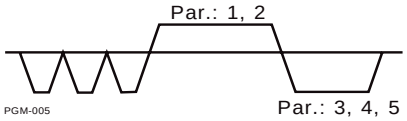


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Disinfection

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

RAX051

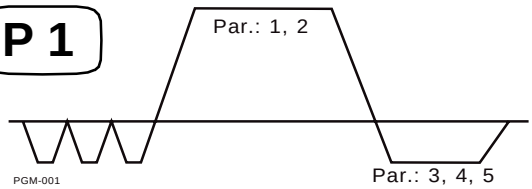
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2002

Porous load, wrapped instruments

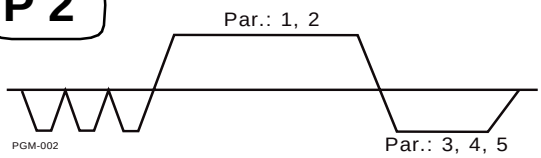
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

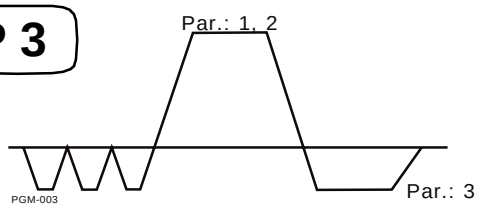
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

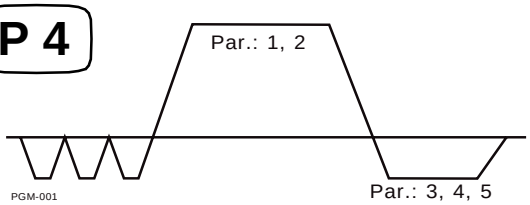


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

General process for solid material

P 4

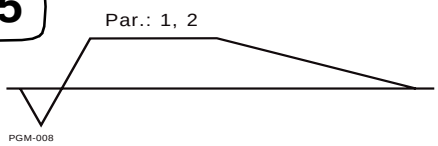


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	_____
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Cool liquids in open or vented containers

P 5

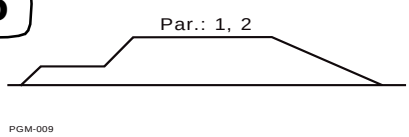


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Warm liquids in open or vented containers

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

RAX053

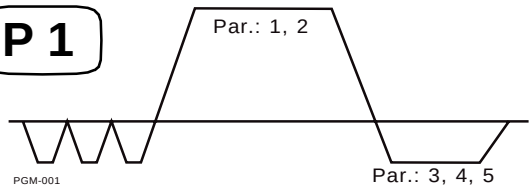
Liquids must be processed with appropriate liquid programs only.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2101

Porous load, wrapped instruments

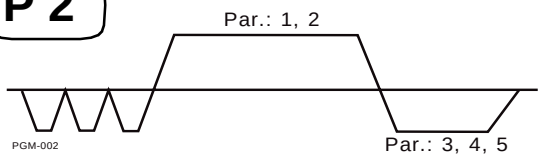
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

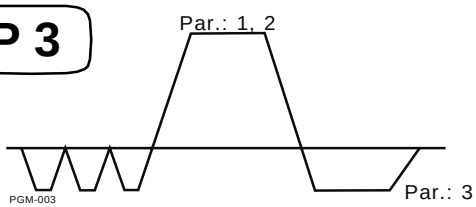
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

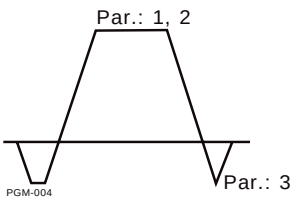


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

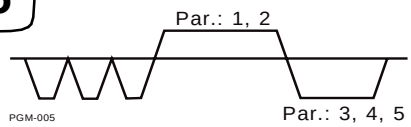


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

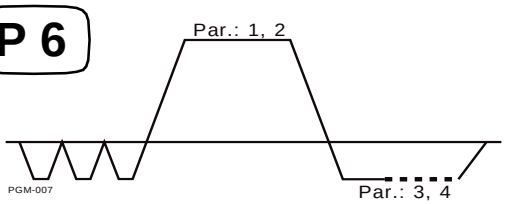


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	_____

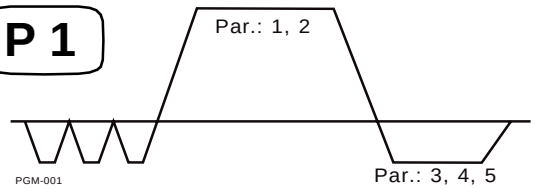
RAX054

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2103

Porous load, wrapped instruments

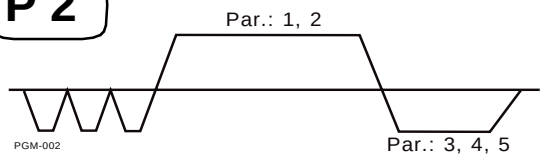
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

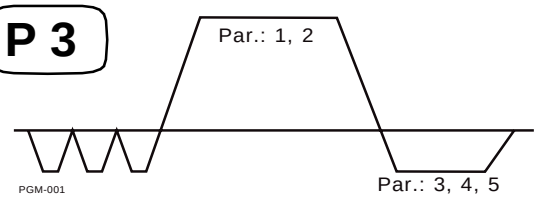
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heavy load, wrapped instruments

P 3

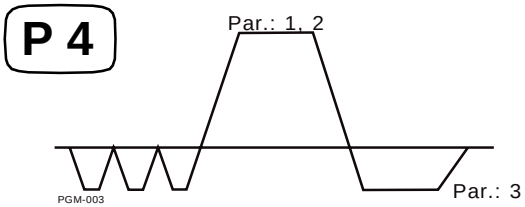


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121 °C	13 °C	_____
2. Sterilizing time	3 - 20 min	7 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	15 min	_____

Bowie / Dick

P 4

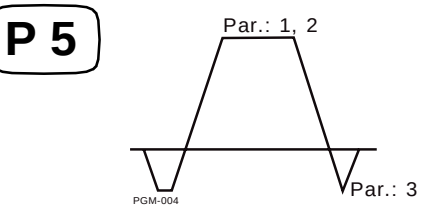


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	0 - 15 min	2,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 5

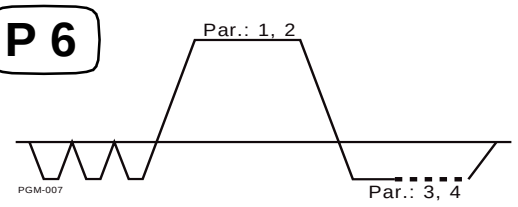


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 90 min	3 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 90 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	_____

RAX056

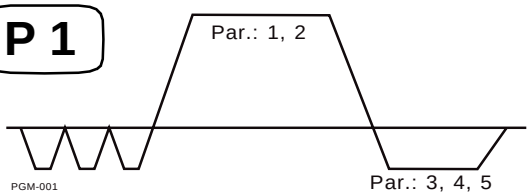
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B 2201

Heat sensitive material, rubber, plastic, porous load

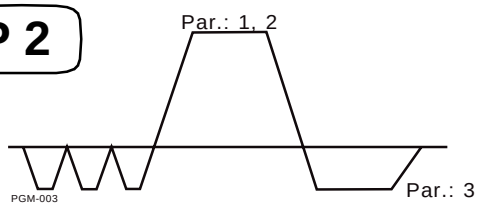
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick

P 2

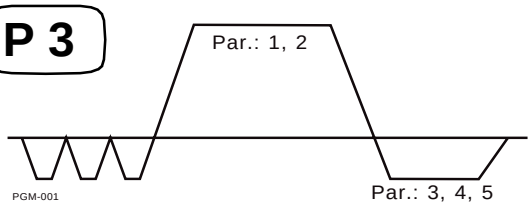


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	0 - 15 min	2,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

General process for solid material

P 3

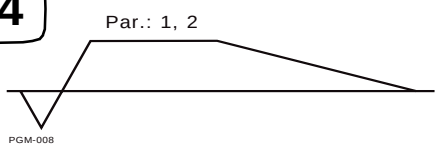


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	13 °C	_____
2. Sterilizing time	3 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Cool liquids in open or vented containers

P 4

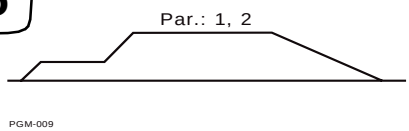


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Warm liquids in open or vented containers

P 5

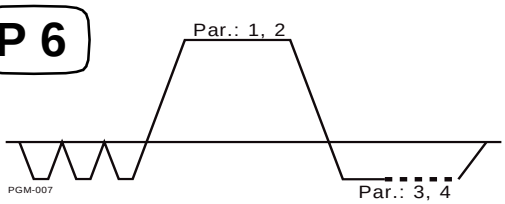


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 100 °C	12 °C	_____
2. Sterilizing time	3 - 90 min	20 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 90 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 min	10 min	_____

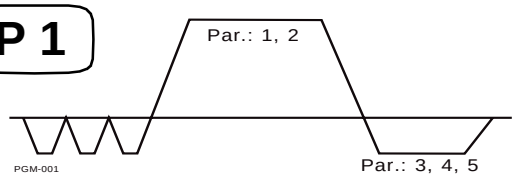
RAX057

Liquids must be processed with appropriate liquid programs only.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2010

Porous load, wrapped instruments

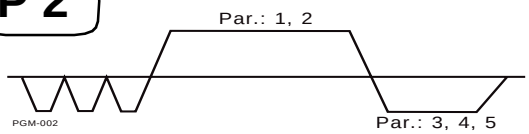
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

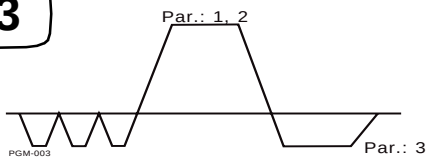
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

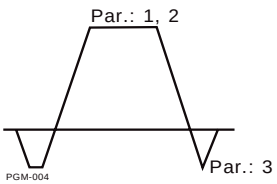


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

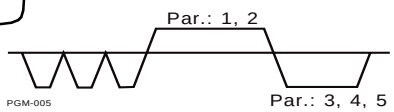


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3,5 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

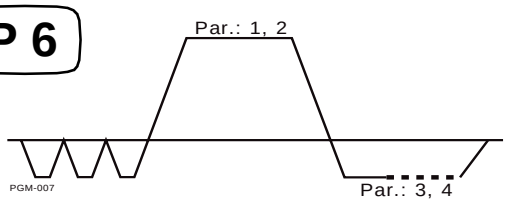


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____

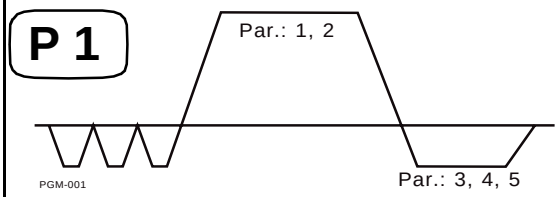
RAX065

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination B2011

Porous load, wrapped instruments

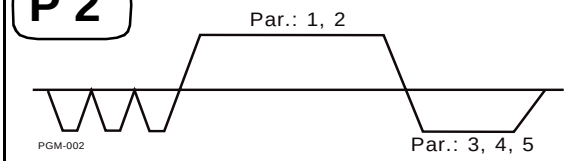
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

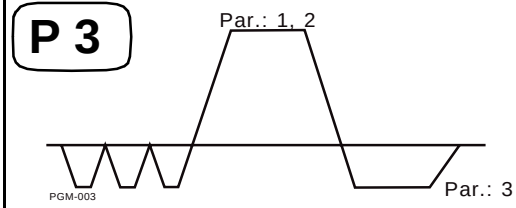
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

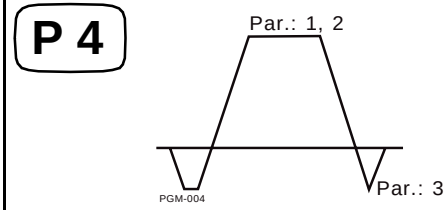


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	3,5 - 15 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

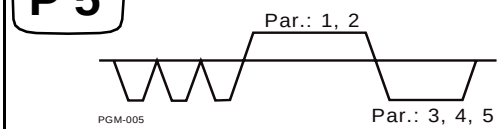


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3,5 - 90 min	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

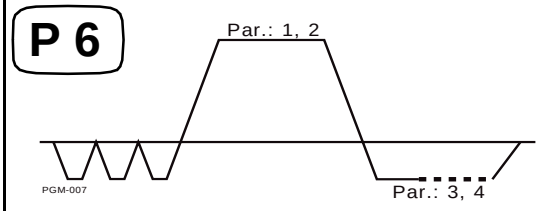


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time.	10 min	10 min	_____

RAX067

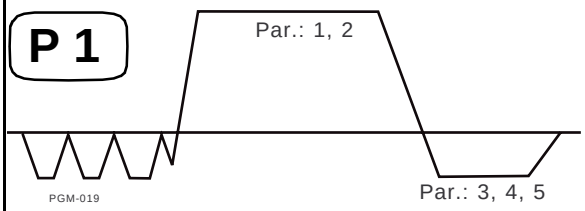
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2111

Porous load, wrapped instruments

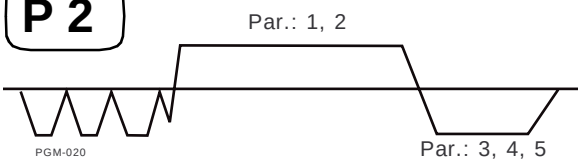
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 min	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

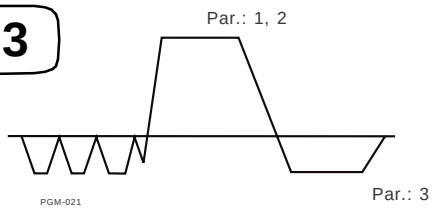
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

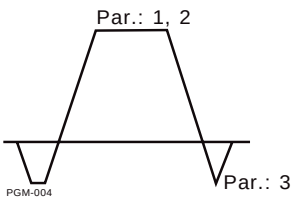


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	0 - 15 min	*) min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
***) Steriltid GE 2606-2609**		**1 min**	
***) Steriltid GE 2612-2618**		**0,25 min**	

Rapid process for single, open instrument

P 4

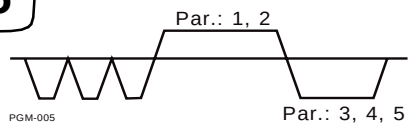


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3,5 - 90 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

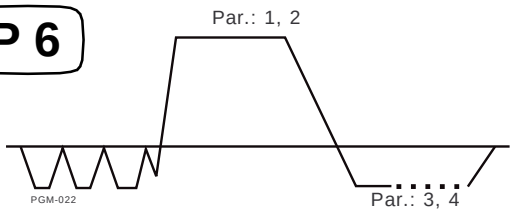


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Semi automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 min	10 min	_____

RAX068

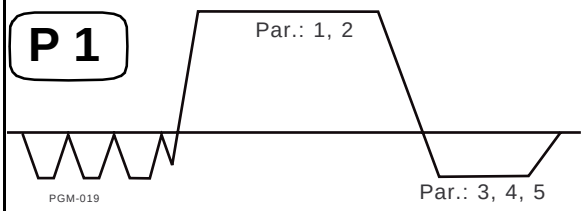
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination page 1/2 B 2511

Porous load, wrapped instruments

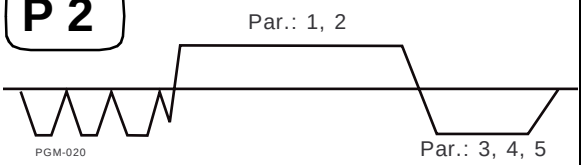
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temperatur:	134°C	134°C	
2. Steril.time:	3 - 7 min	7 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

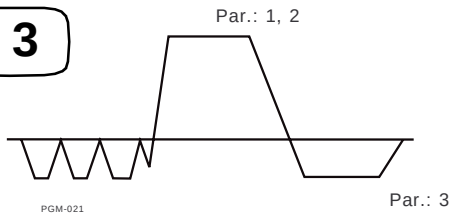
P 2



1. Steril.temperatur:	121°C	121°C	
2. Steril.time:	16 - 20 min	20 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Bowie / Dick

P 3

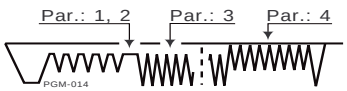


Password required!

1. Steril.temperatur:	134 - 121°C	134°C	_____
2. Steril.time:	0 - 15 min	*) min	_____
3. Postvacuum time:	0 - 90 min	3 min	_____
*) GE 2606-2609	1 min		
*) GE 2612-2618	0,25 min		

Very heat sensitive goods 80°C

P 4

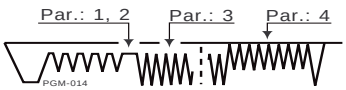


Password required!

1. Steril.temperatur:	80°C	80°C	
2. Steril.time:	10 min	10 min	_____
3. Postpuls steam:	20 - 50	20	_____
4. Postpuls air:	8	8	

Very heat sensitive goods 65°C

P 5



Password required!

1. Steril.temperatur:	65°C	65°C	
2. Steril.time:	30 min	30 min	_____
3. Postpuls steam:	50 - 70	50	_____
4. Postpuls air:	8	8	

Automatic leak test

P 6

Password required!

1. Test time:	10 min	10 min	

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.
Textiles must not be processed with formaldehyde programs.

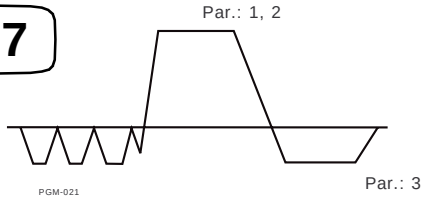
RAX073

GETINGE

Program combination page 2/2 B 2511

Open instruments

P 7

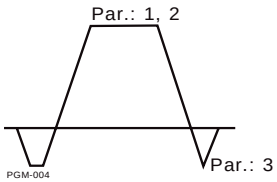


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temperatur:	134 - 121°C	134°C	_____
2. Steril.time:	3,5 - 15 min	3,5 min	_____
3. Postvacuum time:	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 8

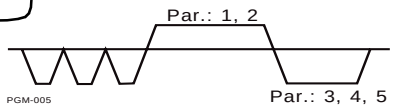


Password required!

1. Steril.temperatur:	134°C	134°C	
2. Steril.time:	3,5 - 90 min	3,5 min	_____
3. Postvacuum time:	0 - 90 min	0 min	_____

Disinfection

P 9



Password required!

1. Disinf.temperatur:	105°C	105°C	
2. Disinf.time:	5 - 90 min	5 min	_____
3. Postvacuum time:	0 - 90 min	5 min	_____
4. Postpuls steam:	0 - 90 min	0 min	_____
5. Postpuls air:	0 - 90 min	0 min	_____

Chamber cleaning

P 10

Password required!

1. Cleaning pulses:	10 - 20	10	_____

RAX073

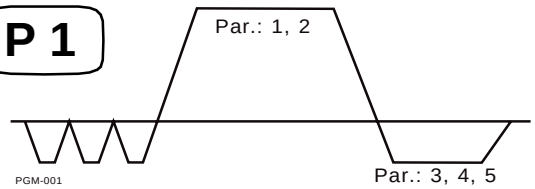
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.
Textiles must not be processed with formaldehyde programs.

GETINGE

Program combination B2001

Porous load, wrapped instruments

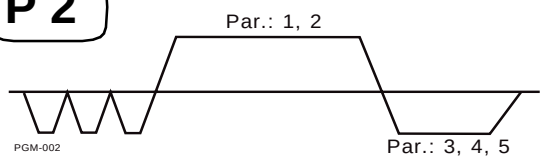
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

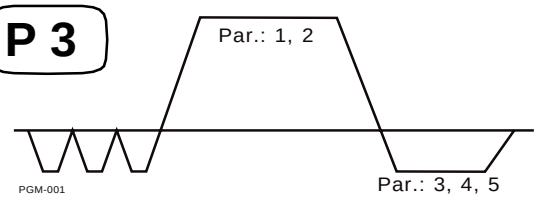
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heavy load, wrapped instruments

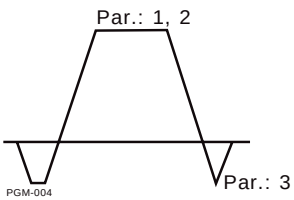
P 3



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3 - 20 min	7 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	15 min	_____

Rapid process for single, open instrument

P 4

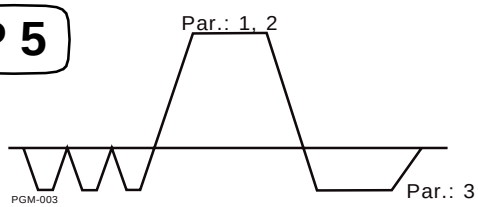


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3,5 - 90 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 5

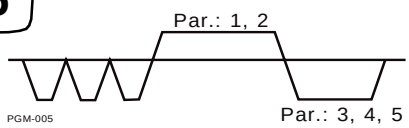


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	_____
2. Sterilizing time	3,5 - 15 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Disinfection

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

RAX074

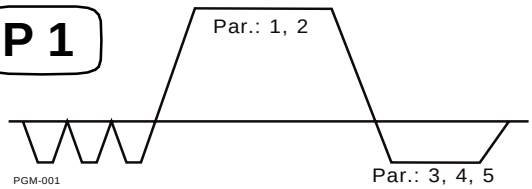
Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

GETINGE

Program combination B2101

Porous load, wrapped instruments

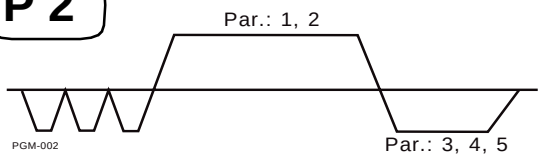
P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3 - 7 mi	7 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Heat sensitive material, rubber, plastic, porous load

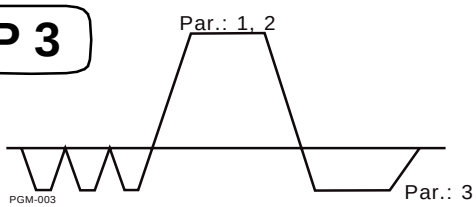
P 2



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	12 °C	12 °C	
2. Sterilizing time	16 - 20 min	20 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Bowie / Dick, open instruments

P 3

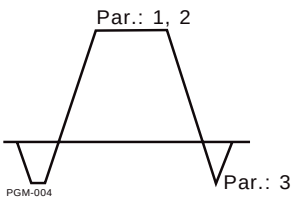


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	134 - 121°C	13 °C	
2. Sterilizing time	0 - 15 min	2,5 min	_____
3. Postvacuum time	0 - 90 min	3 min	_____

Rapid process for single, open instrument

P 4

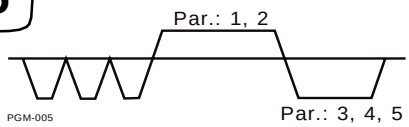


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Sterilizing temp.	13 °C	13 °C	
2. Sterilizing time	3,5 - 90 mi	3,5 min	_____
3. Postvacuum time	0 - 90 min	0 min	_____

Disinfection

P 5

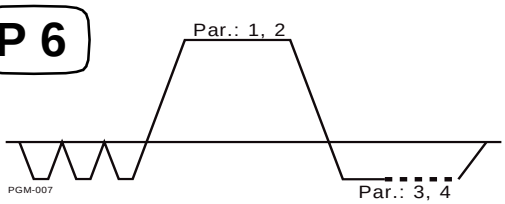


Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time	5 - 90 min	5 min	_____
3. Postvacuum time	0 - 90 min	5 min	_____
4. Postpuls steam	0 - 90 min	0 min	_____
5. Postpuls air	0 - 90 min	0 min	_____

Automatic leak test

P 6



Password required!

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Temperature	134 - 121 °C	13 °C	_____
2. Time	3 - 20 min	7 min	_____
3. Postvacuum time	5 - 90 min	5 min	_____
4. Stabilizing time	10 - 90 min	10 min	_____
5. Test time	10 mi	10 min	_____

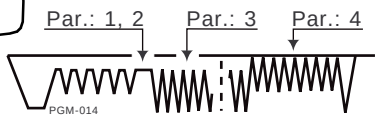
RAX076

Liquids must not be processed with any of these programs.
Hazardous waste and explosive materials must not be processed in this sterilizer.

Program combination F 2901

Heat sensitive material

P 1

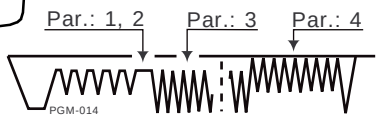


80°C

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temp.	80 °C	80°C	
2. Steril.time.	10 min.	10 min.	
3. Vacuum puls.	20 - 50	20	_____
4. Air puls.	8	8	
5. Formaldehyd puls.	10	10	

Heat sensitive material

P 2



65°C

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temp.	65 °C	65 °C	
2. Steril.time.	30 min.	30 min.	
3. Vacuum puls.	50 - 70	50	_____
4. Air puls.	8	8	
5. Formaldehyd puls.	10	10	

Chamber cleaning

P 3

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Steril.temp.	12 °C	12 °C	
2. Cleaning puls.	9 - 20	9	

Password required

Automatic leak test

P 4

Max accepted leakage rate

13 mbar / 10 min

Password required

Liquids, hazardous waste and explosive materials must not be processed in this sterilizer.
Textiles must not be processed with formaldehyde program.

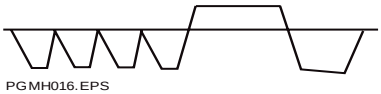
RAX081

Program combination Page 1/2

B 2421

Disinfection. Heavy contaminated goods in BGA class ABC

P 1



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time.	5 min	5 min	
3. Drying vacuum.	5 min	5 min	

Disinfection. Heat sensitive goods in BGA class A(B)*

P 2

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	75 °C	75 °C	
2. Disinfection time.	20 min	20 min	
3. Drying vacuum.	5 min	5 min	

***) Exept Virushepatitis**

Disinfection. Heat sensitive goods in BGA class A(B)*

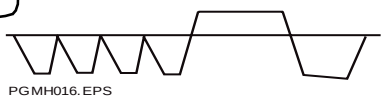
P 3

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	80 °C	80 °C	
2. Disinfection time.	10 min	10 min	
3. Drying vacuum.	5 min	5 min	

***) Exept Virushepatitis**

Disinfection. Less contaminated goods in BGA class AB

P 4



PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time.	1 min	1 min	
3. Drying vacuum.	5 min	5 min	

Disinfection flash program. Non porous goods witout cavities.

P 5

PARAMETER	RANGE	DELIVERED	ACTUAL
1. Disinfection temp.	10 °C	10 °C	
2. Disinfection time.	5 min	5 min	
3. Drying vacuum.	5 min	5 min	

Password required

Automatic Leak Test

P 6

PARAMETER	RANGE	DELIVERED	ACTUAL
Test time:	10 min	10 min	

Password required

Liquids, hazardous waste and explosive material must not be processed in this autoclave . BGA classified goods shall be disinfected with programs reffered to above.

RAX085

Program combination Page 2/2

BGA - classification of goods for disinfection.

Getinge disinfection sterilizers are equipped with a number of progams approved and listed by the German authority BGA. A precondition for approval is that the correct type of goods is disinfected with each program. To simplify decisions as to which goods can be disinfected with different types of process, the BGA has issued a scale with differing degrees of difficulty.

Each individual program in a Getinge sterilizer must only be used for the BGA-specified classes stated on the program combination. Programs in which such information does not appear are not BGA approved and are therefore blocked with an authorisation code. In these cases the user is responsible for evaluating the destructive effect of the disinfection process on the type of goods to be disinfected.

Classification of destructive effect according to BGA

A Destruction of vegetative bacterial micro-organisms including myco-bacteria, as well as fungi including spores of fungi.

B Inactivation of viruses.

C Destruction of illness-inducing anthrax spores.

D Destruction where sterilization must take place.

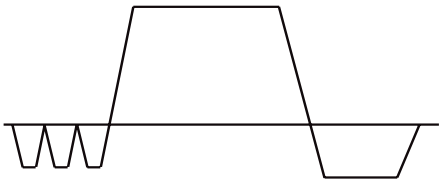
RAX085

GETINGE

Program combination A2120

Utensils, textiles

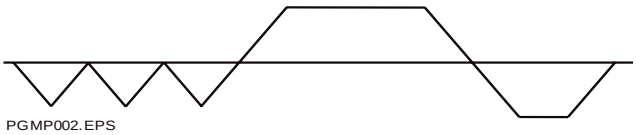
P1



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99 h

Filter / Utensils

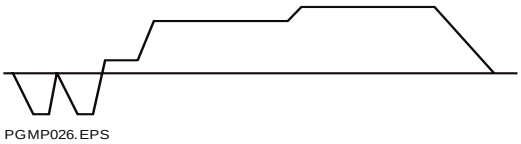
P2



PARAMETER RANGES
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Drying vacuum time: 0 min - 99 h
Slopes: 0,050 - 1,000 bar/ min

Ampoules *Cooling*

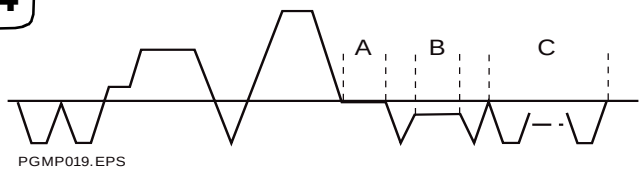
P3



PARAMETER RANGES
Prevacuum: 1 - 5 pulses
Ster. temp.: 100 - 135 °C
Ster. time: 0 min - 99 h
Support press.: 1,500 - 3,500 bar(a)
Cooling temp.: 20 - 80 °C

Ampoules *Crack test, dye test, rinsing, drying*

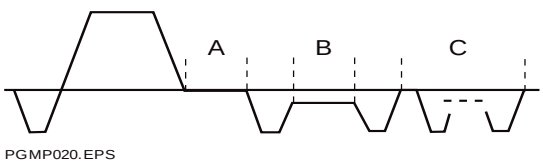
P4



PARAMETER RANGES
Prevacuum: 1 - 5 pulses
Steril. temp.: 100 - 135 °C
Steril. time: 0 min - 99 h
Crack vacuum: 0,050- 1,000 bar
Dye test: 1,000 - 3,700 bar
Dyebath time: 0 min. - 99 h
Rinse time (A): 0 min - 99 h
Warm up (B): 40 - 95 °C
Drying (C): 1 - 10 pulses
Postvacuum: 0 min. - 99 h

Ampoules *Separate dye test, rinsing, drying*

P5



PARAMETER RANGES
Prevacuum: 0,050 - 1,000 bar
Crack vacuum: 0,050 - 1,000 bar
Dye test: 1,000 - 3,700 bar
Dyebath time: 0 min. - 99 h
Rinse time (A): 0 min - 99 h
Warm up (B): 40 - 95 °C
Drying (C): 1 - 10 pulses
Post vacuum: 0 min. - 99 h

Automatic leak rate test

P6

PARAMETER SETTINGS
Max accepted leak rate:
13 mbar/10 min

RAX092

Liquids must be processed with appropriate liquid programs only.
Hazardous waste must not be processed in this sterilizer.

THE DOOR

SAH013 . . . . . Horizontally moving sliding door

General

The horizontally moving sliding door is suspended in two ball bushings travelling on a supporting steel rod. This is attached to a rigid bar above the door. The lower part of the door is guided by rollers on each side of the thick plate forming the door surface.

The opening and closing motion of the door is executed by a pneumatic motor, equipped with a timing belt pulley working on a timing belt attached to the door. The door motion speed is controlled by adjustable chokes in the motor air admittance pipe. As an additional safety measure there is a load sensor fitted on the pneumatic motor, to sense any bigger object obstructing the door closing. The load sensor stops the door-motion before a squeeze-situation occurs, thereby avoiding personal and material damage.

SAV020 . . . . . Vertically moving sliding door

General

The opening and closing motion of the door is executed by a pneumatic cylinder. The door motion speed is controlled by adjustable chokes in the cylinder admittance pipe. As a safety measure there is a squeeze protection integrated in the top of the door.

SAX011 . . . . . General

When the door is closed a mechanical lock will block the door. This lock activates a switch which makes it possible to pressurize the groove behind the door seal.

The doors are kept closed by the automatic control unit and the above mentioned lock while cycles are in progress and also when supply media fail. The doors do not open until the condition *chamber pressure*

= *atmospheric pressure* is fulfilled, not even in case of an electric failure causing an opening command.

The door closing system comprises a number of parts and components which cooperate in a tested, safe way from personnel- and material point of view. These items must not be subject to violence or improper influence of any kind which alter their initial function.

Adjustments on doors and associated equipment must be made by authorized personnel only.

Seal between door and chamber

The door seal is an endless, thick-walled silicon rubber tube, movable in a groove when pushed against the door by means of steam, gas or air pressure. To enable for the door to move freely, the sealing tube can be sucked back from the door surface into its groove by a vacuum device.

Media to chamber

Before entering media to the chamber, all following requirements have to be fulfilled:

A Emergency stop not activated

B Doors are closed.

C The door seals are pressurized.

D The control system gives signals for operating the media valves.

SAX028 . . . . . General

When the door is closed a mechanical lock will block the door. This lock activates a limit switch which makes it possible to pressurize the groove behind the door seal.

The doors are kept closed by the automatic control unit and the above mentioned lock while cycles are in progress and also when supply media fail. The doors do not open until the condition *chamber pressure*

= *atmospheric pressure (±100 mbar)* is fulfilled, not even in case of an electric failure causing an opening command.

The door closing system comprises a number of parts and components which cooperate in a tested, safe way from personnel- and material point of view. These items must not be subject to violence or improper influence of any kind which alter their initial function.

Adjustments on doors and associated equipment must be made by authorized personnel only.

Seal between door and chamber

The door seal is an endless, thick-walled silicon rubber tube, movable in a groove when pushed against the door by means of steam, gas or air pressure. To enable for the door to move freely, the sealing tube can be sucked back from the door surface into its groove by a vacuum device.

Media to chamber

Before entering media to the chamber, all following requirements have to be fulfilled:

A Emergency stop not activated

B Doors are closed.

C The door seals are pressurized.

D The control system gives signals for operating the media valves.

SAH019 . . . . . General

When the door is completely closed, it is locked mechanically by a spring-loaded catch dropping down behind the door. The catch activates a pneumatic limit position and consequently makes it possible to pressurize the door seal.

While the process is in progress and in the event of any losses o media (electricity, steam or compressed air), the doors are kept locked by the automatic control equipment and the door catch described above. The doors cannot be opened before the condition "Chamber overpres-

sure = zero (± 100 mbar)" is met, even if an electrical fault were to cause an opening command.

The closing system of the door consists of a number of components whose interaction has been carefully tested to provide the necessary safety against damage to equipment and injury to people. These parts must not be subjected to force or handled in an incorrect way which may affect their original function.

Doors and associated components may only be adjusted by authorized personnel.

Seal between door and chamber

TThe seal between the door and chamber is formed by a rubber gasket in a groove around the opening of the chamber. The gasket is pressed against the door by steam, or in exceptional cases by compressed air or an inert gas. The gasket is released from the door when the pressure medium is evacuated.

Media to the chamber

Before media can be released into the chamber, the following conditions must be fulfilled:

A Emergency stop has not been used.

B The door(s) is/are closed.

C The door gasket is pressurized.

D The control system emits control signals to open the media valves.

SAV021 . . . . . Vertically moving sliding door

Adjusting the door motion

The door speed is controlled by a variable restriction in the pipe supplying the door cylinder with compressed air. Changing the closing speed will result in a corresponding influence on the opening speed.

1. Adjust the restriction (see piping diagram) so that the door will close in about 15-18 seconds.

2. Check that the motion is even and free from jerks.
3. Check that the door does not scrape against closely situated metal components. Advise for corrections are given under the head line ”Adjusting the door position”.

Adjusting the door position

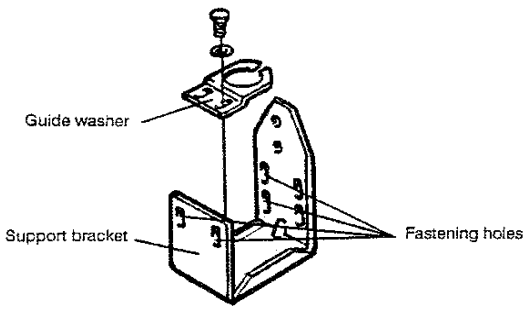
A. VERTICALLY

This adjustment becomes necessary if the distance between the top of the open door and the chamber bottom is not = 10 mm.

1. Measure the door adjustment required.
2. Lift away the closed door covering lower front plate after removing its two screws near the floor (see chapter INSTALLATION).
3. Close the door by activating its pilot valve by hand.
4. Prop up and lower the door until it rests upon the prop.

Make sure the door is resting securely on the prop!

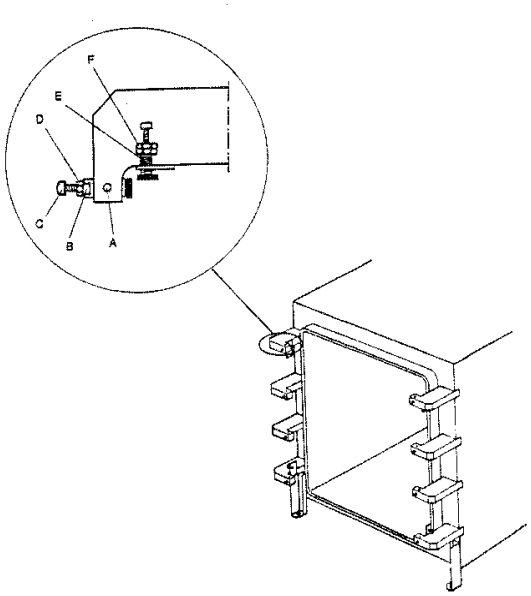
5. Loosen the support bracket, adjust it in accordance with the measured requirements and tighten the screws.



6. Pressurize the cylinder, remove the prop and lower the door. Check the level in relation to the sterilizer bottom.
7. Check that the closed door covers the door seal groove completely (small piston stroke margins).
8. Check that the upper end of the door is horizontal. When needed, move the lower end of the cylinder piston sideways after the attachment screws of the guide washer has been loosened. Tighten the screws when the washer is in correct position.
9. Assemble dismantled parts.

B. SIDEWAYS

1. Remove the front plates as described in the chapter INSTALLATION under the headline ”Transportation”.
2. Loosen partly the side guide attachment nut F.
3. Adjust the door sideways by means of the screws E so as to form a clearance space to the guides of 2-3 mm.
4. The door should be symmetrically located in front of the chamber opening with the small deviations required for clearance to the trim plates.
5. Fasten the side guides upon completed adjustment.



C. AXIALLY

1. The clearance space between the door surface and the door seal groove should be about 2,5 mm.
2. Remove the front plates as described in the chapter ”INSTALLATION” under the headline ”Transportation”.
3. Loosen partly the locking screws A and the locking nut D.
4. If needed, loosen the screws B and insert a 2,5 mm thick plate strip between door and seal groove at each corner.
5. Adjust B until the plate strips are squeezed lightly between door and seal groove.

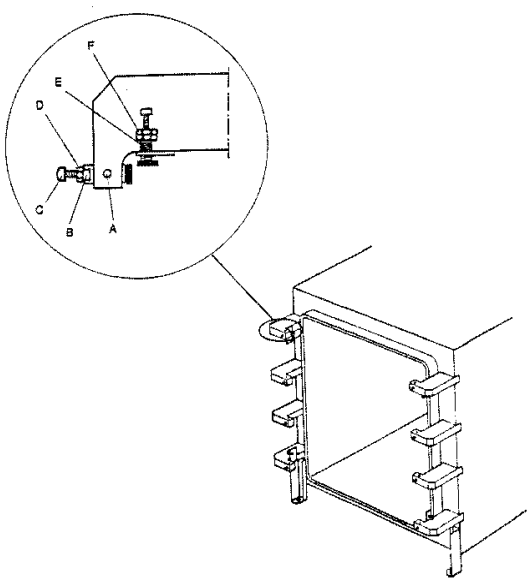
All screws have to be firmly tightened. The screws are an integrated part of the pressure vessel.

6. Tighten A and D.

7. Remove the plate strips.

Removing the door

1. Remove the lower front panel and both side front panels.
2. Place a prop or similar to stop the door about 150 mm from its end position when lowered.



Beware of the danger of insufficient support

3. Lower the door.
4. Remove the air hose fitting from the foot of the piston end.
5. Loosen the eight nuts D and remove the screws C together with the two brass guides.
6. Lean the top of the door away from the sterilizer and lift it out. The weight of the door is approx. 75 kg.

Adjusting the door motion

The door speed is controlled by a variable restriction in the pipe supplying the door cylinder with compressed air. Changing the closing speed will result in a corresponding influence on the opening speed.

1. Adjust the restriction (see piping diagram) so that the door will close in about 10 - 15 seconds.
2. Check that the motion is even and free from jerks.
3. Check that the door does not scrape against closely situated metal components. Advise for corrections are given under the head line ”Adjusting the door position”.

Adjusting the door position

Whenever removing or adjusting the door, the compressed air supply must be disengaged in order to prevent any accidental movement.

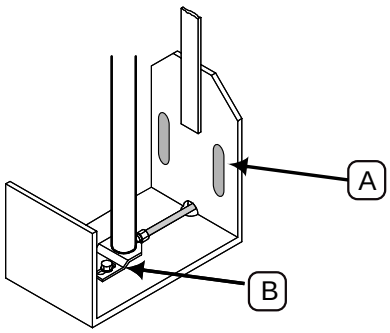
A. VERTICALLY

This adjustment becomes necessary if the distance between the top of the open door and the chamber bottom is not = 10 mm, or if the door is not completely covering the sealing groove

1. Measure the door adjustment required.
2. Remove the lower front panel in accordance with the instructions under the “Internal transport” heading in the INSTALLATION chapter.
3. Close the door by activating its pilot valve by hand.
4. Prop up and lower the door until it rests upon the prop.

Make sure the door is resting securely on the prop!

5. Loosen the support bracket, adjust it in accordance with the measured requirements and tighten the screws (A).



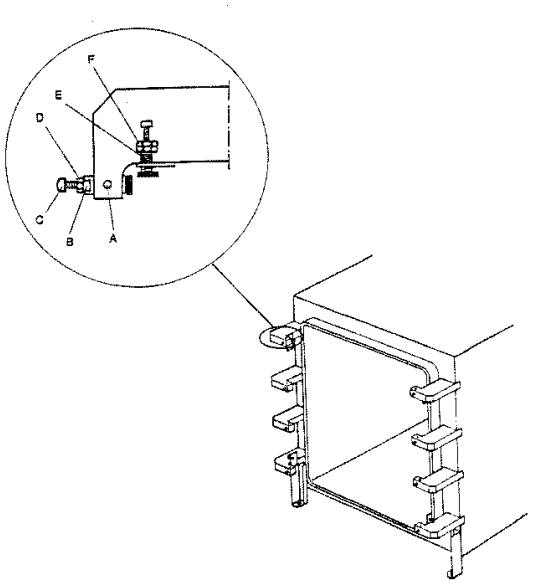
6. Pressurize the cylinder, remove the prop and lower the door. Check the level in relation to the sterilizer bottom.
7. Check that the closed door covers the door seal groove completely (small piston stroke margins).
8. Check that the upper end of the door is horizontal. When needed, move the lower end of the cylinder piston sideways after the attachment screws (B) of the guide washer has been loosened. Tighten the screws when the washer is in correct position.
9. Assemble dismantled parts...

The setting of the door locking mechanism must be checked after any adjustments have been made. See under the 'Interlocking of starting function' heading.

B. SIDEWAYS

If may be necessary to adjust the transverse position of the door if the horizontal play of 2-3 mm between the door and its guides is to maintained.

1. Remove the front plates as described in the chapter INSTALLATION under the headline ”Interbuilding transportation”.
2. Loosen partly the side guide attachment nut F.
3. Adjust the door sideways by means of the screws E so as to form a clearance space to the guides of 2-3 mm.
4. The door should be symmetrically located in front of the chamber opening with the small deviations required for clearance to the trim plates.
5. Fasten the side guides upon completed adjustment.



C. AXIALLY

It may be necessary to adjust the axial position of the door if the distance between the door and the chamber is not correct.

1. The clearance space between the door surface and the door seal groove should be about 2,5 mm.
2. Remove the front plates as described in the chapter ”INSTALLATION” under the headline ”Interbuilding transportation”.
3. Loosen partly the locking screws A and the locking nut D.
4. If needed, loosen the screws B and insert a 2,5 mm thick plate strip between door and seal groove at each corner.
5. Adjust B until the plate strips are squeezed lightly between door and seal groove.

All screws have to be firmly tightened. The screws are an integrated part of the pressure vessel.

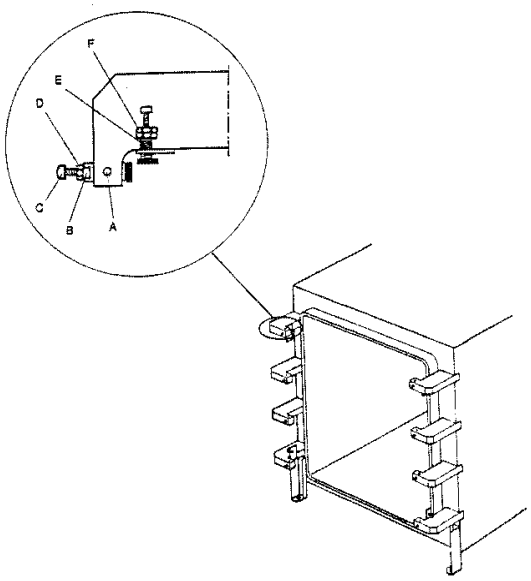
6. Tighten A and D.
7. Remove the plate strips.

The setting of the door locking mechanism must be checked after any adjustments have been made. See under the 'Interlocking of starting function' heading.

Removing the door

1. Remove the side panels, the lower panel and the upper cross-stay on which it is mounted.

2. Place a prop or similar to stop the door about 150 mm from its end position when lowered.



Beware of the danger of insufficient support

3. Lower the door.
4. Remove the air hose fitting from the foot of the piston end.
5. Remove the two leaf springs that press the door forwards.
6. Remove the safety plate on the top of the door.

The door will fall forward when the safety plate and then the guides are removed. Beware of the risk of trapping.

7. Loosen the eight nuts D and remove the screws C together with the two brass guides.
8. Lean the top of the door away from the sterilizer and lift it out. The weight of the door is approx. 75 kg.

SAH014 . . . . . Horizontally moving sliding door

Squeeze protection and door motion

The door speed is controlled by a pressure reduction valve in the pipe supplying the pneumatic motor with compressed air. Changing the closing speed will result i a corresponding influence on the opening speed.

Control of the closing force

The force for closing shall always be less than 150 N, according to standards. It is possible to adjust the maximum force by adjusting the pressure reduction valve. This will, however, also affect the door speed.

The pneumatic motor is mounted on a lever. When the closing force exceeds 120 N, the lever will activate a pneumatic switch and stop the door closing operation.

Safety Check

1. Check that the motion is even and free from jerks and that the closing force does not exceed 150 N.
2. Check that the lever and the pneumatic switch are working properly.
3. Check that the door does not scrape against closely situated metal components.

Checking and adjusting the door position

Depending on the weak door driving force it is important that the door is correctly suspended to enable for it to travel between the end points without any additional friction to the one caused by the ball bushings. The steps below should be taken only if problem arises with the door motion or tightness. Prior to the measures below, the sterilizer has to be installed according to valid installation instructions.

Vertically

- The door is vertically correct positioned when the key of the limit switch hits the switch hole symmetrically.
- Check that the door bolt adjusting screws hit the bolts radially when the above conditions are fulfilled. Adjust the door vertically when needed using the two door support screws. Make sure the door does not slant.

SAH017. . . . . .Anti-trapping device & adjustment of door position Ph.div.

Anti-trapping device

The operating speed and closing force of the door are controlled by a restriction in the compressed-air motor. According to the current standard (IEC 1010-2-41), the closing force must not exceed 150 N.

The compressed-air motor is mounted on a spring-loaded arm. When the closing force exceeds 120 N this arm activates a pneumatic switch which stops the door closing motion.

Safety check

1. Check that the door operates freely. When adjusting, see CHECKING AND ADJUSTING THE DOOR POSITION.
2. Check that the motion is smooth and that the closing force does not exceed 150 N when the springing of the arm is blocked.
3. Check that the arm and the pneumatic switch are working properly and that they stop the motion of the door at a force of about 120 N.

Using the screw (21) the spring tension can be adjust ed on the spring-loaded motor mounting (arm) so that the valve cuts off the air supply to the motor, preventing the door from moving.

NOTE: If the spring tension is too low, the door will stop for no good reason.

Checking and adjusting the door position

Because of the low operating force it is important that the door is correctly mounted so that it runs between its end positions without friction, apart from the friction of the ball bushing. **Only take action if there are problems with the motion or sealing of the door.** Do not take any of the steps below until the sterilizer has been installed in accordance with the installation instructions.

Door height setting

When the door height is correctly adjsuted, the bolt adjusting screws must line up with the bolt pins (15). Adjust with screws (13) if necessary).

Plumb adjustment of the door

- The door must be positioned centrally between the seal groove and the setting screws so that it runs freely.
- The door can be adjusted as follows: slacken the door holder fixing screws (12) so that the door can be moved in the slotted until the door hangs vertically (plumb). The door cover plate must be in place during this adjustment.

Crush protection

The speed and closing force of the door are controlled by a built-in restrictor in the compressed-air motor. The closing force according to the applicable standard (IEC 1010-2-41) must not exceed 150 N.

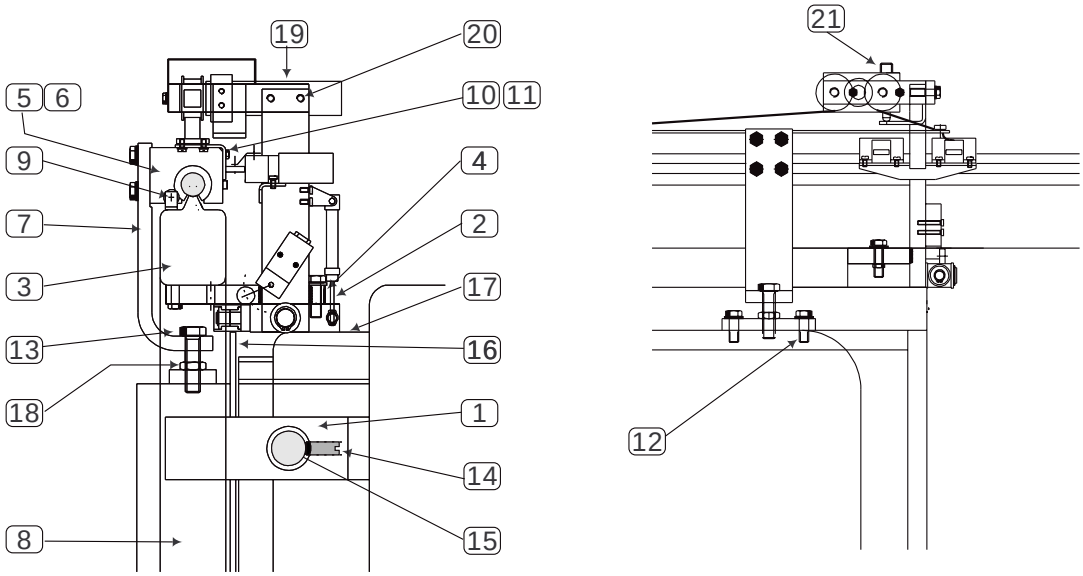
The compressed-air motor is mounted on a spring-loaded arm. When the closing force exceeds 120 N this arm activates a pneumatic switch which stops the closing movement of the door. At the same time a pressure switch which is connected to the control system cuts off the closing command from this. The spring force has been adjusted in the factory and normally does not need to be adjusted or changed.

Safety check

1. Check that the door runs freely. For adjustment, see CHECKING AND ADJUSTMENT OF DOOR POSITION.
2. Check that the movement is even and free of jerks and that the closing force does not exceed 150 N when the suspension of the arm is blocked.
3. Check that the arm and the pneumatic switch work perfectly and switch off the closing movement of the door at a force of approx. 120 N.

The set screw (21) on the spring-loaded motor suspension (arm) (see illustration below) can be used if necessary to adjust the spring tension so that the valve breaks the supply of air to the motor if movement of the door is obstructed.

Setting value: The set screw must be adjusted so that the resilient pin on which the cradle rests does not work loose. Then tighten the lock nut. Finally check that the closing force does not exceed 120 N.



IMPORTANT: If the spring tension is too low, the result will be that the door stops without reason.

4. Check that the pressure switch which is connected to the control system works. The digital input (see wiring diagram, input door not stopped) which is connected to the pressure switch must be inactivated (LED goes out) when the closing movement of the door is blocked. The check is carried out where appropriate on the pressure switches of both doors.

Carry out adjustment where required as follows:

Turn and remove the DOOR-BLOCKING KEY which belongs to the door on the side where the pressure switch is to be adjusted. Unscrew the adjusting nut of the pressure switch (anticlockwise) until the LED lights up. Screw in the nut (clockwise) until the contact is heard to change. Then unscrew the nut (anticlockwise) until the contact changes again. Unscrew another ¼ turn. Reset the key after adjustment.

5. The pressure switch PS1 which checks the operation of the pneumatic switch forms part of the safety interlocks which are monitored automatically and whose operation therefore does not need to be tested.

Carry out adjustment where required as follows:

Open the door on the operating side. Unscrew the adjusting nut of the pressure switch (anticlockwise) until terminal 107 is energized. Screw in the nut (clockwise) until the contact is heard to change. Then unscrew the nut (anticlockwise) until the contact changes again. Unscrew another ¼ turn.

Checking and adjustment of door position

Because of the weak propulsive force, it is important that the door is correctly suspended so that it runs between its end positions without friction over and above that which is due to the ball bushing. **Action is only required if problems arise with movement or leaktightness of the door.** Do not take any of the steps below before the autoclave has been installed in accordance with applicable installation instructions.

Height-setting of the door

When the height is correct, the adjusting screws (14) of the locking plates must line up with the middle of the locking pins (15). Adjust if necessary with the screws (13).

Adjustment of the vertical position of the door

- The door is set in a central position between the gasket groove and the adjusting screws so that it runs freely.
- The door can be adjusted by loosening the retaining screws of the door holder so that the door holder can be slid in the oval holes until the door hangs vertically. The covering plate of the door must be fitted during the adjustment.

SAH007. . . . . Horizontally moving sliding door <= 9 14 XX

Axially

- Close the door until the bolts are just outside their appropriate holes in the door holder.
- Loosen the rollers guiding the lower part of the door to make the door hang freely.
- Check that the distance between the door surface and the seal groove is about 3 mm all around the door (when the door is pressed away from the chamber).

If the lower part of the door should come closer alternatively further away from the groove:
Slacken the fastening screws of the supporting screw attachment bosses and adjust the latter in its oval holes until the door is vertical.
Tighten the boss attachment screws.

Set the door holder adjusting screw as follows:

1. Loosen the locking screws of all the door holder adjusting screws and loosen also the latter a few turns.

2. Close the door completely and insert at each corner a 3 mm thick feeler gauge (plate strip) between the door and the top of the groove.
3. Tighten all adjusting screws quite light until the feeler gauges are retained.
4. Lock the adjusting screws and remove the feeler gauges.

All screws have to be firmly tightened. The screws are an integrated part of the pressure vessel.

The clearance space between door and chamber
should be about 1,5 mm when the door is freely suspended. With the described procedure, the distance between door bolt and adjusting screw will consequently be about 1,5 mm.

- Slacken the fastening screws and move when needed the entire door supporting bar including its two attachment devices which are equipped with oval holes.

Do not tamper with the adjusting screws of the attachment device.

- Adjust and tighten the guiding rollers at the lower part of the door.

SAH008 . . . . . Horizontally moving sliding door >9 14 XX

Axially

- Close the door until the bolts are just outside their appropriate holes in the door holder.
- Loosen the rollers guiding the lower part of the door to make the door hang freely.
- Check that the distance between the door surface and the seal groove is about 6 mm all around the door (when the door is pressed away from the chamber).

If the lower part of the door should come closer alternatively further away from the groove:
Slacken the fastening screws of the supporting screw attachment bosses and adjust the latter in its oval holes until the door is vertical.
Tighten the boss attachment screws.

Set the door holder adjusting screw as follows:

1. Loosen the locking screws of all the door holder adjusting screws and loosen also the latter a few turns.
2. Close the door completely and insert at each corner a 6 mm thick feeler gauge (plate strip) between the door and the top of the groove.
3. Tighten all adjusting screws quite light until the feeler gauges are retained.
4. Lock the adjusting screws and remove the feeler gauges..

All screws have to be firmly tightened. The screws are an integrated part of the pressure vessel.

The clearance space between door and chamber
should be about 3 mm when the door is freely suspended. With the described procedure, the distance between door bolt and adjusting screw will consequently be about 3 mm.

- Slacken the fastening screws and move when needed the entire door supporting bar including its two attachment devices which are equipped with oval holes.

Do not tamper with the adjusting screws of the attachment device.

- Adjust and tighten the guiding rollers at the lower part of the door.

SAM010 . . . . . Adjusting the distance between door and chamber. GE 2044

Adjusting the distance between door and chamber

The clearance space between the door surface and the door seal groove should be about 2.5 mm.

1. Remove the lower panel plate. Mark the position of the beam with the spring catch. Remove the beam.
2. Loosen the upper locking bolts, inside the corner profiles. Those locking bolts fixes the position of the side panels of the door. Loose the bolts 2 turns only.
3. Remove the two plates at the sides of the door opening.
4. Loosen partly the M6 attachment screws and the M16 adjustment screws of the door guides.

5. Fit a 2.5 mm thick plate strip between the door and the top of the gasket groove at each corner.
6. Adjust the M16 screws just until the door rests upon the plate strips without squeezing them.
7. Tighten the M6 screws and remove the strips.
8. Restore the panel plates.

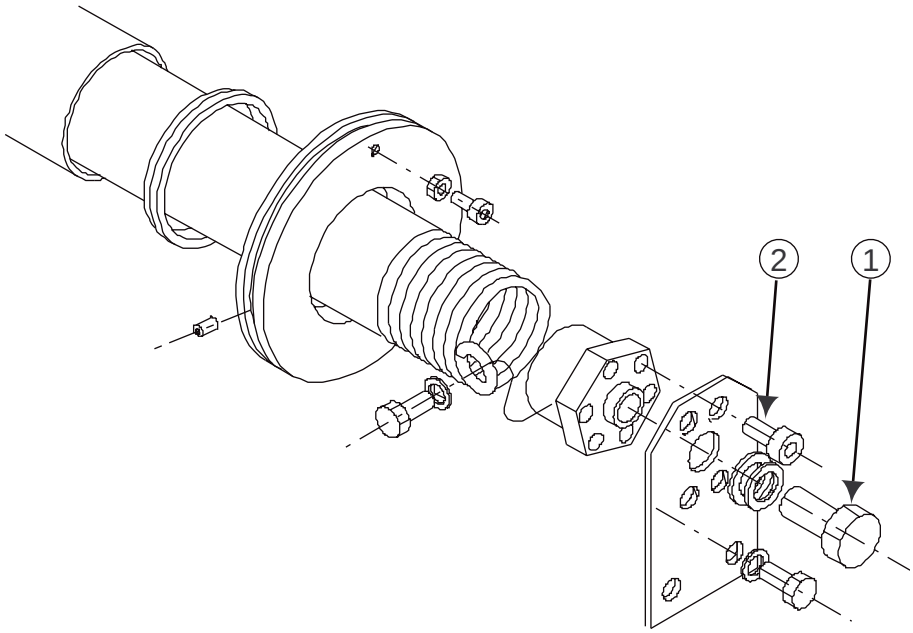
Adjusting the door weight compensating spring

In connection with replacement of parts in the door weight compensating system, adjustment of the spring force should be made as necessary in following way:

1. Lower the door to the end position.
2. With a spanner, prevent the hexagon 1 from rotating while removing the screws 2.
3. Twist the hexagon just until the door starts moving upwards. Insert a retaining pin in an aligning hole for the screw 2 if a new grip with the spanner is needed.

Perform the moments above with great care. Be sure not to loose the grip around the hexagon and absolutely not the spanner.

4. Lock when in final position with the screws 2 in the nearest situated holes.
5. Check that the tension of the spring evens out the weight of the door. The door shall be able to rest at any position from fully open to fully closed.



The door seal

The door seal is that part of the pressure vessel that is most exposed to wear and tear. The composition of the material, the design of the seal, its fitting and care are of extreme importance for reliable operation and long life of the seal. Getinge's door seal consists of a special silicone material, and its physical design is intended to make best use of its special characteristics.

Use only genuine Getinge door seals. Remember that each seal is an integral part of the pressure vessel.

Care

There are several negative factors that adversely affect the life of the door seal. By avoiding them as far as possible, the life of the seal can be considerably extended.

- Avoid leaving the sterilizer switched on in the stand-by mode during the night. Although the door seal material can withstand continuous temperatures of more than 200 °C, it slowly degrades where it is in contact with the seal groove. Leaving the sterilizer continuously energised will shorten the life of the seal by about 60%.
- If the sterilizer has a steam generator, the generator must be drained at the prescribed intervals. Any feed water other than de-ionised feed water will gradually build up a concentration of minerals and other substances. At high concentrations, several of these substances are carried over with the steam and precipitated on the seal as weak acids.
- If the sterilizer is connected to a central steam system, the quality of the steam is decisive in determining the life of the seal. Chemicals are often added to the feed water for such purposes as protecting pipes against corrosion. Undesirable chemical characteristics of the steam include high hydrazine or carbon dioxide contents.
- Keep the seal lubricating layer intact and the sealing groove clean. The lubricating layer not only assists the seal in sliding, but is also an effective barrier against long-term chemical breakdown. See also under the “Lubrication of the door seal” heading.

SAX015 . . . . . Functional test of valves for chamber and gasket groove

Functional test of valves for chamber and gasket groove

Run a leak test. If the test runs without disturbances, above valves are working properly.

- In case the steam valve, for the groove, doesn't open the leak test will stop.
- In case the steam valve, for the groove, doesn't close the door can't be opened after test. This is due to friction between door and gasket.
- A leaking chamber-steam valve will result in a pressure increase. Also other factors can result in pressure increase. A leaking steam valve will also give problems with the chamber-temperature during normal operation.

SAM016 . . . . . Functional check on the valves of the chamber and the seal groove GEF

Functional check on the valves of the chamber and the seal groove

Carry out a leak test. If this works normally, the valves mentioned above are working.

- If the air valve of the seal groove fails to open, the leak test cannot be carried out.
- If the air valve of the seal groove does not close, the door cannot be opened after the test. This is due to friction with the door seal.
- If an increase in pressure is obtained in the leak test, this may be due to a leaking steam valve to the chamber. This kind of leakage also makes it difficult to keep an even temperature in the chamber.

SAH021 . . . . . Checking function of valves of chamber and gasket groove

Checking function of door gasket and valves of gasket groove

Carry out leakage test in accordance with the description in the chapter entitled PROCESS in the OPERATING MANUAL. If no disturbances occur during the test, the valves referred to above are working.

- If the valve for pressurizing the gasket groove does not open, the leakage test cannot be carried out.
- If the valve for pressurizing the gasket groove does not close or if the outlet valve of the gasket groove does not open, the door cannot be opened after the test is carried out, because of friction against the door gasket. The same thing happens if the gasket has hardened or if the lack of a lubricating layer causes it to stick in the gasket groove.
- If a rise in pressure occurs during the leakage test, this may be due to a non-leaktight steam valve to the chamber or a worn gasket. Leakage of this type also causes difficulties in keeping an even temperature in the chamber.

- If a similar rise in pressure is noted in the sterilization phase during a program with a high sterilization temperature, this is a sign that the door gasket is worn out.

SAX030 . . . . . Checking the performance of the chamber and sealing groove valves

Checking the performance of the door seal and packing groove valves

Perform a leak test, as described in the PROCESS chapter in the OPERATOR'S MANUAL. If the test runs without disturbances, above valves are working properly.

- In case the steam valve, for the groove, doesn't open the leak test will stop.
- If the steam valve for the sealing groove does not close, or if the drain valve does not open, the door cannot be opened after the test as a result of friction against the door seal. The same thing will occur if the seal has hardened or if the absence of its lubricant layer has caused it to fasten in the sealing groove.

WARNING - Risk of crushing
Be very careful if the door remains fastened to the seal. When it comes away from the seal, it will drop down out of control.

- If the leak test results in a pressure rise, this can be due to a number of effects, one of which is a leaking steam valve to the chamber or a worn seal. A leak of this type will also make it difficult to maintain a constant temperature in the chamber.
- If a similar pressure rise occurs particularly during the sterilization phase of programs with high sterilization temperatures, it indicates that the door seal is worn out.

SAX001 . . . . . General

Lubricating the door seal

At delivery the door seal is prepared with a dry lubricant which results in a graphite grey appearance. The lubricating film has to be renewed in order to maintain the safe function of the seal. Renewal of the lubricating layer must not be made with the seal in place because repeated spraying in the groove will build up layers which eventually will cause the gasket to leak.

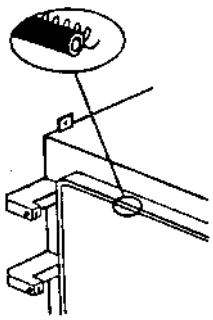
SAM015 . . . . . Replacing door seal GE 2044. Preparation and completion

Lubricating and replacing door seal.

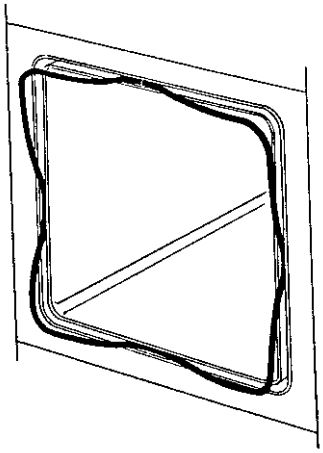
1. Remove the screws holding the upper cover plate of the door in which the handle is attached.
2. Remove the upper cover plate and lower the door completely so that the seal groove is revealed.
3. Prevent the possibility of the door being closed while the work is in progress by blocking it.
4. Refit the upper cover plate of the door when the work is completed.

SAM011. . . . . Lubricating the door seal. Manually operated door

1. Take precautions so as to make it impossible for the door to close while the work is carried out.
2. Remove the screws holding the top plate to which the door handle is attached
3. Remove the door seal from the groove. Be careful with seal and groove.
4. Clean the groove of anything that may interfere with subsequent sealing.
5. Clean the rubber seal with alcohol until its surface is felt absolutely smooth.
6. Spray the seal all over with dry lubricant ordering No. 466 66 95-01.
7. Check that the spiral is correctly positioned in the groove.



8. Press the gasket joint into the middle of the upper horizontal part of the groove.



9. Press the middle of the gasket loop into the middle of the lower horizontal part of the groove and finally the middle of the two remaining loops into the middle of the vertical parts of the groove.
10. Push the gasket into the groove. Always work towards the corners to make these collect the excess length of the gasket.
11. Refit the door top plate.

SAH009 . . . . . Sterilizer >69XX

Block the door in open position, by turning the ”Door blockage key”, while the work is carried out. Whenever entering the chamber, remove the key and keep it with you.

SAX002 . . . . . Sterilizer <=69XX

Disconnect the air supply or similar to make it impossible for the door to close while the work is carried out.

SAH010 . . . . . Horizontally moving sliding door

- Open the door completely

SAV018 . . . . . Vertically moving sliding door

When applicable, see also chapter ”Special advice for sterilizer with automatic loader”.

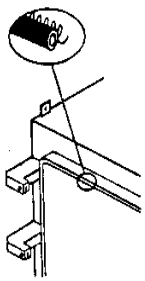
- Remove one of the safety plate screws and push the plate towards the empty screw hole until it becomes free at the opposite end.

- By means of a 6 mm allen-key, loosen the four cylinder attachment screws six turns each.

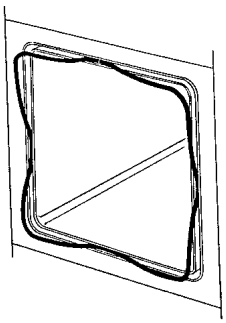
CAUTION! Do not tamper with the four smaller screws which have now become loose.

SAX003 . . . . . General. NOT GEE

- Remove the gasket from the groove. Be careful with gasket and groove.
- Clean the groove of anything that may interfere with subsequent sealing.
- Clean the gasket with alcohol until its surface is felt absolutely smooth.
- Spray the gasket all over with dry lubricant ordering No. 466 6695-01.
- Check that the helix is at place at the bottom of the groove.



- Press the gasket joint into the middle of the upper horizontal part of the groove.

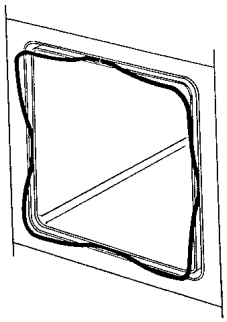


- Press the middle of the gasket loop into the middle of the lower horizontal part of the groove and finally the middle of the two remaining loops into the middle of the vertical parts of the groove.
- Push the gasket into the groove. Always work towards the corners to make these collect the excess length of the gasket.

SAX024 . . . . . Cleaning gasket and gasket groove. GEE general

- Remove the gasket from the groove. Be careful with gasket and groove.

- Clean the groove of anything that may interfere with subsequent sealing.
- Clean the gasket with alcohol until its surface is felt absolutely smooth.
- Spray the gasket all over with dry lubricant ordering No. 466 6695-01.
- Press the gasket joint into the middle of the upper horizontal part of the groove.



- Press the middle of the gasket loop into the middle of the lower horizontal part of the groove and finally the middle of the two remaining loops into the middle of the vertical parts of the groove.
- Push the gasket into the groove. Always work towards the corners to make these collect the excess length of the gasket.

SAV019 . . . . . Vertically moving sliding door

- Tighten the four cylinder attachment screws.
- Fit the safety plate by pushing it to the side with the missing screw, press it down and hook it up at the opposite end. Tighten the fixing screw and check the function.

SAX004 . . . . . General

Replacing the door seal

Proceed as described under ”Lubricating the door seal” but skip sections concerning cleaning seal and spraying seal.

SAV024 . . . . . Replacing the door seal, the new vertical automatic sliding door

Lubrication and replacement of the door seal

The need for lubrication or replacement of the door seal can vary depending on the factors mentioned above. This means that the intervals should be adjusted as indicated by experience.

Preparation

Remove one of the safety plate screws and slide the plate towards the empty screw hole until the other end comes off. Lift it off carefully.

The door will be pushed forward by the spring in the door catch when the safety plate is removed. Beware of the risk of crushing.

Make sure that the door cannot be closed accidentally while work is in progress by turning off the control power supply and disconnecting the compressed air supply.

If, when the door is in its forward position, it is allowed to move upwards, the gap between the sealing groove and the door will immediately decrease from about 16 mm to 2.5 mm. There is nothing to reduce the force behind this movement, and it could severely crush a hand etc.

SAH022. . . . . Gasket replacement, sideways-opening door

Lubrication and replacement of door gasket

The door gasket is treated at the time of delivery with a dry lubricant, lubricating varnish, which gives the gasket a pencil-grey shade. The lubricant coat must be maintained for the gasket to work perfectly. The coat of lubricating varnish must not be renewed while the gasket is in position as repeated spraying in the groove causes deposits which adversely affect the seal.

The need for lubrication or replacement of the door gasket varies because of the factors mentioned previously. The intervals should therefore be adapted according to the specific experience from each plant.

Preparations

- Open the door completely.

Make sure that the door is not closed while work is in progress, i.e. turn off the operating current and disconnect the compressed air.

Removal and cleaning

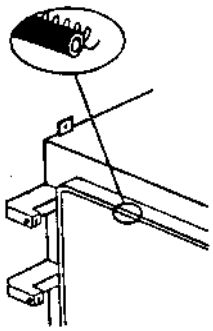
1. Remove the seal from the now accessible groove. Take care not to damage the groove and seal.
2. Clean the sealing groove thoroughly.
   - Remove any deposits of hardened lubricant, using a very fine abrasive sheet (320 grade or finer).
   - Clean the groove with a soap solution and dry it with clean paper.
   - Repeat the washing until the paper is completely clean after drying off the groove.

When relubricating an old seal

1. Wipe the seal with alcohol so that it feels completely smooth.
2. Inspect the seal where it has been in contact with the sealing groove. If the material shows signs of beginning to turn to powder on the surface, the seal should be replaced.
3. Spray the entire seal with a thin layer of lubricant (ordering no. 4666695-01).

When fitting the seal

1. Ensure that the spring is in position in the bottom of the groove.



Relubricated seal

2. Refit the seal in its previous position. Centre the corners so that they are in exactly the same position as before.

New seal

3. When fitting a new seal, it is of the utmost importance that the slight excess length is distributed correctly. Assistance of a second person makes fitting easier.
   - Hold up the seal against the groove so that the thumb grips are approximately at each corner, with the seal joint in the middle.
   - A second person should now carefully mark one of the thumb grips using a felt pen.
   - Stretch out the seal and fold it carefully so that the felt pen mark is at one of the ends.
   - Make another mark at the opposite end. The seal is now marked into two equal lengths, with the joint about a quarter of the way from one of the marks.
   - Stretch out the seal again and fold it carefully so that both the felt pen marks are opposite each other in the centre, and then mark the new ends. The seal is now divided up into four equal parts, with the joint in the middle of one of them.
4. Fit the seal in the groove, with the joint at the top and the four felt tip pen marks in the middle of each bend in the groove.
5. Press the seal carefully into the groove, a little at a time, alternating from side to side, along the straight parts, so that the excess length is distributed as evenly as possible.

SAV025 . . . . . Replacement of the door seal, new vertical automatic door, conclusion

6. Fit the safety plate by moving towards the side in which there is no screw, pressing it down and engaging it on the side in which the screw has been left. Tighten the securing screw and check its performance.

SAV022 . . . . . Vertically moving sliding door

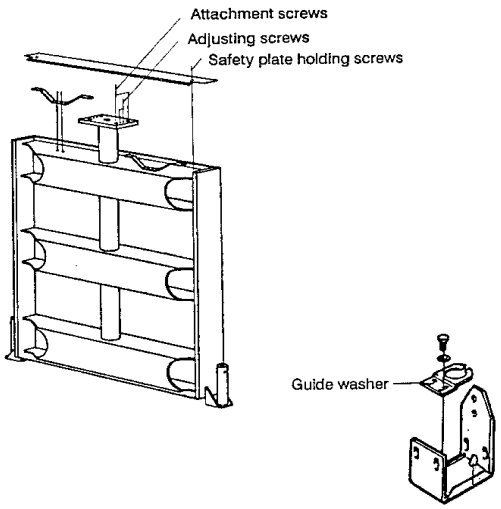
Replacing the door cylinder

1. Close the door by operating its air solenoid valve by hand.
2. Place a prop or similar to stop the door about 150 mm from its end position when lowered manual.

Beware of the danger of insufficient support

3. Remove the cylinder air hose fitting located on the piston stand and remove prop to completely lower the door.

4. Remove one of the safety plate attachment screws and push the plate towards the empty screw hole until it loosens at the opposite end.
5. By means of a 6 mm allen-key, remove the four cylinder attachment screws.
6. Prevent the piston from moving out of the cylinder by keeping the safety valve at its bottom closed (pulled out). Lift away the cylinder.
7. Attach nipple and hose to the piston of the new cylinder.
8. Fit the cylinder into the door. Prevent as earlier, or with a piece of string the piston from moving out of the cylinder.
9. Attach it by means of the four allen-screws. With the four adjusting screws, make the cylinder align with the centre line of the notches of the stiffening bars.
10. Attach the piston end guide washer in that position which makes the door move in the most proper way.



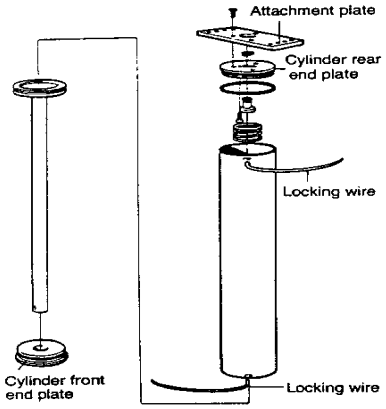
Replacing the piston seal

A worn-out piston seal can not be replaced as separate unit but the whole piston has to be replaced.

First perform ”Replacement of door cylinder”, section 1-7.

1. Fix the cylinder carefully in a vice jaw.
2. Remove the cylinder attachment plate.
3. Twist the cylinder end plate until the end of the locking wire appears in the locking wire hole.
4. Twist the cylinder end plate in that direction which feeds the locking wire out of the hole. The wire may need help from a tool to enter the edge of the hole.
5. Pull out the bent end of the locking wire from its driver hole.

6. Remove the cylinder end plate and replace its O-ring in connection with the replacement of the piston even if it appears to be free from damage.
7. Push out the piston and fix it in a vice jaw.
8. Protect the piston rod from tool marks with a piece of weak plate around its lower part, which is stiffened up by an insert piece of brass, while gripping there, but no where else, with a pipe wrench or similar tool.
9. Twist the piston rod for regular threading off. If sticky, apply heat carefully to soften the thread sealing compound. Clean the piston rod thread with a wire brush.
10. Apply ”Loctite 542" hydraulic sealing compound on the thread and screw the new piston on to the piston rod.
11. Assemble the cylinder and install it according to the points 8-11 under the head line ”Replacing the door cylinder”.



Door safety arrangements

Squeeze protection

The door motion is executed by a pneumatic cylinder the air inlet of which is considerably choked. An air exhaust valve having much larger flow capacity is arranged at the free cylinder end which is directed upwards. Any obstruction present during door closing exerts pressure on a plate running the entire length of the upper edge of the door a which this plate makes the exhaust valve open, thereby stopping the upward motion immediately. This will prevent personnel injuries and material damage.

Safety check

The safety check shall be performed in the early stage of the door-closing operation. This in order to reduce the risk for injuries due to squeezing.

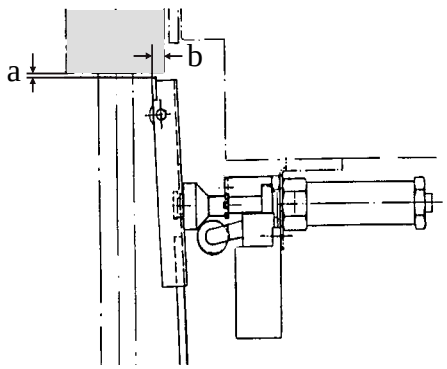
1. Check that the air supply pressure is maximum permissible 8 bar.
2. Open the door speed control valve entirely.
3. Close manually the door cylinder exhaust valve and open the inlet valve to make the door close.
4. Push downwards by hand and check that the plate moves freely so as to enable for the valve to open for push on any spot of the plate without use of extreme force.

Blocking the start and opening the door

To prevent the door from opening by its own weight in case the pneumatic door cylinder should become depressurized, a brace underneath the door keeps it in closed position. The brace is brought in stop position under the door by spring-force 20 seconds after a door closing command has been given. A limit switch senses the position of the brace thereby stopping the process from being started and mediums to be admitted to the chamber before the door is completely closed.

Safety check

1. Check that the air pressure is minimum permissible 6 bar.
2. Admit compressed cylinder air to make the door close.



3. Check that the measurement ”a” is 3-4 mm.
   Adjust the height of the brace when needed.
4. Check that the end of the brace is well within the cylinder circumference. (”b”= 12-17 mm)

5. Check by hearing that the contact of the limit switch does not change over until the brace is safely under the pneumatic cylinder.

Beware of the danger of squeezing, while manipulating the brace.

6. Check that the retaining pin is in place, preventing the limit switch operating cone from moving on the thread.
7. Operate the brace cylinder air valve repeatedly to check that the motion of the piston is smooth and free from jerks.
8. Check while the door is moving that it stops and remains stopped when pushing the EMERGENCY STOP-button.

Replacing the door cylinder

1. Close the door by operating its air solenoid valve by hand.
2. Place a prop or similar to stop the door about 150 mm from its end position when lowered manual.

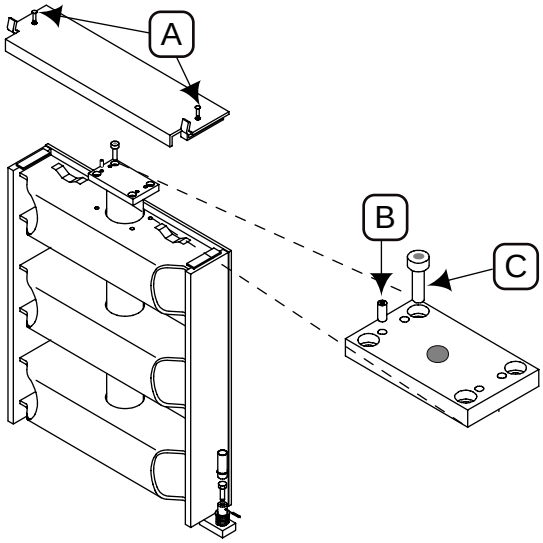
Beware of the danger of insufficient support

3. Remove the cylinder air hose fitting located on the piston stand. Lift the door slightly, remove the prop and lower the door as far as it will go.
4. Remove one of the safety plate attachment screws and push the plate towards the empty screw hole until it loosens at the opposite end. The door will now be pushed forward by the spring.

Beware of the risk of crashing when the prop and/or safety plate is/are removed.

5. By means of a 6 mm allen-key, remove the four cylinder attachment screws.
6. Prevent the piston from moving out of the cylinder by keeping the safety valve at its bottom closed (pulled out). Lift away the cylinder.
7. Attach nipple and hose to the piston of the new cylinder.

8. Fit the cylinder into the door. Prevent as earlier, or with a piece of string the piston from moving out of the cylinder.
9. Attach it by means of the four allen-screws. With the four adjusting screws, make the cylinder align with the centre line of the notches of the stiffening bars.
10. Attach the piston end guide washer in that position which makes the door move in the most proper way.



Replacing the piston seal

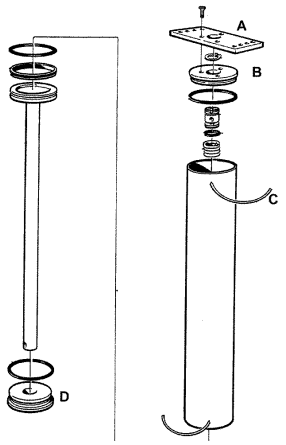
A worn-out piston seal can not be replaced as separate unit but the whole piston has to be replaced.

First perform ”Replacement of door cylinder”, section 1-7.

1. Fix the cylinder carefully in a vice jaw.
2. Remove the cylinder attachment plate.
3. Twist the cylinder end plate until the end of the locking wire appears in the locking wire hole.
4. Twist the cylinder end plate in that direction which feeds the locking wire out of the hole. The wire may need help from a tool to enter the edge of the hole.
5. Pull out the bent end of the locking wire from its driver hole.
6. Remove the cylinder end plate and replace its O-ring in connection with the replacement of the piston even if it appears to be free from damage.
7. Push out the piston and fix it in a vice jaw.
8. Protect the piston rod from tool marks with a piece of weak plate around its lower part, which is stiffened up by an insert piece of

brass, while gripping there, but no where else, with a pipe wrench or similar tool.

9. Twist the piston rod for regular threading off. If sticky, apply heat carefully to soften the thread sealing compound. Clean the piston rod thread with a wire brush.
10. Apply ”Loctite 542" hydraulic sealing compound on the thread and screw the new piston on to the piston rod.
11. Assemble the cylinder and install it according to the points 8-11 under the head line ”Replacing the door cylinder”.



Door safety arrangements

Squeeze protection

The door motion is executed by a pneumatic cylinder the air inlet of which is considerably choked. An air exhaust valve having much larger flow capacity is arranged at the free cylinder end which is directed upwards. Any obstruction present during door closing exerts pressure on a plate running the entire length of the upper edge of the door a which this plate makes the exhaust valve open, thereby stopping the upward motion immediately. This will prevent personnel injuries and material damage.

Safety check

The safety check shall be performed in the early stage of the door-closing operation. This in order to reduce the risk for injuries due to squeezing.

1. Check that the air supply pressure is maximum permissible 8 bar.
2. Open the door speed control valve entirely.

3. Close manually the door cylinder exhaust valve and open the inlet valve to make the door close.

The safety check must be performed as soon as the door starts to move, in order to minimise any risk of crushing.

4. Press the centre of the door's safety strip and check that it is free to move so that the cylinder exhaust valve opens without requiring any substantial downward pressure. Check at other positions along the safety strip, to make sure that the required downward pressure is not excessive anywhere.
5. If the strip is held down, the exhaust from the cylinder must be such that the door reverses direction and opens.

Emergency stop

Pressing the emergency stop push-button immediately stops the door motion and switches the control system to the alarm state.

Safety check

1. Open the door and press the emergency stop push-button while the door is moving. The door must stop and the control system must generate an alarm. Reset the alarm and the emergency stop push-button and repeat the door opening command.
2. Close the door, repeating the above test while the door is closing.

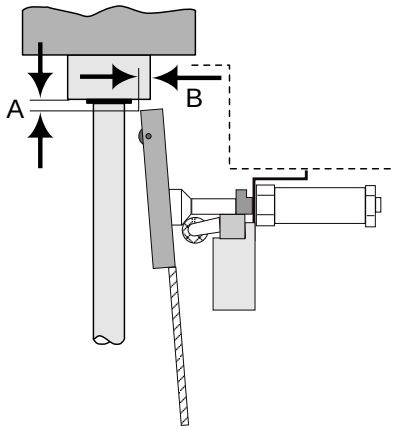
If any of the above features do not work, send immediately for a trained sterilizer technician for inspection and adjustment.

Blocking the start and opening the door

To prevent the door from opening by its own weight in case the pneumatic door cylinder should become depressurized, a brace underneath the door keeps it in closed position. The brace is brought in stop position under the door by spring-force 20 seconds after a door closing command has been given. A limit switch senses the position of the brace thereby stopping the process from being started and mediums to be admitted to the chamber before the door is completely closed.

Safety check

1. Check that the air pressure is minimum permissible 6 bar.
2. Admit compressed cylinder air to make the door close.



3. Check that the measurement ”a” is 3-4 mm.
   Adjust the height of the brace when needed.
4. Check that the end of the brace is well within the cylinder circumference. (”b”= 12-17 mm)
5. Check by hearing that the contact of the limit switch does not change over until the brace is safely under the pneumatic cylinder.

Beware of the danger of squeezing, while manipulating the brace.

6. Check that the retaining pin is in place, preventing the limit switch operating cone from moving on the thread.
7. Operate the brace cylinder air valve repeatedly to check that the motion of the piston is smooth and free from jerks.
8. Cylinder retraction is restricted in order to reduce the noise level. The spring return, however, is not restricted. Adjust the retraction if necessary.
9. Check the screws securing the brace and their condition.

Door safety arrangements

Blocking the admittance of chamber mediums

Several different safety systems must be intact before media are supplied to the chamber. The systems are all independent of the control system. They cut off the electric power supply to the media valves.

1. A limit switch senses that the door is fully closed before the signal is sent to the media valve.

Setting the limit switch
For safety reasons the limit switch cannot be adjusted.

Safety check

- Switch on the operating current with the doors closed and check that there is voltage at terminal 5131.
- Open the door of the feed side and check that voltage disappears from terminal 5131.
- On a through sterilizer, perform the same check on the discharge side after the process has been run.

2. When an emergency stop is pressed, the circuit is broken.

Safety check

- Switch on the operating current with the doors closed and check that there is voltage at terminal 5031.
- Press the emergency stop and check that voltage disappears from terminal 5131. Reset the emergency stop and check that voltage returns at terminal 5031.
- On a through sterilizer, perform the same check on the discharge side after the process has been run.

Preventing admission of media to the chamber

Several different safety systems must be intact before media are supplied to the chamber. The systems are all independent of the control system. They cut off the electric power supply to the media valves.

The limit switch

A limit switch senses that the door is fully closed before the signal is sent to the media valve.

Setting the limit switch
For safety reasons the limit switch cannot be adjusted.

Safety check

1. Switch on the operating current with the doors closed and check that there is voltage at terminal 5131.
2. Open the door of the feed side and check that voltage disappears from terminal 5131.
3. On a through sterilizer, perform the same check on the discharge side after the process has been run.

Emergency stop

When an emergency stop is pressed, the circuit is broken.

Safety check

1. Switch on the operating current with the doors closed and check that there is voltage at terminal 5031.
2. Press the emergency stop and check that voltage disappears from terminal 5131. Reset the emergency stop and check that voltage returns at terminal 5031.
3. On a double ended sterilizer, perform the same check on the discharge side after the process has been run.

SAX017 . . . . . Safety check. Pressure switch for door seal groove. GE 2044

4. A pressure switch with two electrical contacts as the activating devices senses the pressure in the door seal groove and closes the valves which admit steam, compressed air, gas etc. to the chamber in case the seal groove pressure should fall below prescribed value. With double ended sterilizers there is one pressure switch for both doors because these have a common pressure supply.

The pressure switch, which is designated PS07, cuts off the power supply to the valves with contact interface 1 (referred to from now on as PS07/1). The other contact, PS07/2 (contact interface 2 on PS07) a signal to the control system is cut off, causing an alarm.

Setting the pressure switch

- Switch off the control unit power switch when the sterilizer is in stand-by mode.
- Close the test pressure gauge cock of the seal groove and attach a mano-vacuummeter after the plug is removed. Remove the cover of the pressure switch PS07.

- Turn the pressure setting nuts clockwise until contact change over is heard.
- Switch on the control unit power and start a process with prevacuum and steam as media to door seal.
- Open the test pressure gauge cock slowly until the gauge indicates 1,4 bar(e).
- Slowly turn the setting nut of the associated pressure switch contact PS07/2 anticlockwise until the control system LED at input 1026 goes out.
- Open the test pressure gauge cock slowly until the gauge indicates 1.6 bar(e).
- If an alarm is given, press button “C” and then the “Start” button. The process continues.
- When the sound indicates that the chamber steam admittance valve has opened, and pressure rise of the chamber can be observed, the pressure adjusting nut of the contacts PS07/1 should be turned anti-clockwise until the steam valve closes.
- Switch off the control unit power switch and close the test pressure gauge cock.
- Refit the plug of test pressure gauge cock and the pressure switch cover when the pipes are at atmospheric pressure.
- Open entirely the test pressure gauge cock, start the sterilizer, reset error message and end the process.

Safety check

- Close the test pressure gauge cock of the seal groove and attach a mano-vacuummeter after the plug is removed. Remove the cover of the pressure switch.
- Switch on the control unit power and start a process with prevacuum.
- Open the test pressure gauge cock slowly until the gauge indicates 1.8 bar(e). This moment has to be executed within 10 minutes as otherwise an alarm is emitted.
- Close the test pressure gauge cock and then check while the pressure decreases due to condensation that an alarm is emitted between 1,4 and 1,5 bar(e).

Cool the pipe with a wet rag to speed up condensation.

- Open the test pressure gauge cock slowly until the gauge indicates 2,0 bar(e).
- Push the button C and then Start. The process continues.

- When the sound indicates that the steam supply to the chamber has opened, and a pressure rise in the chamber can be observed, fully close the pressure gauge cock. Cool the pipe and check that the pressure is in the range 1.6 to 1.7 bar(e) when the sound indicates that the steam valve closes.
- Switch off the power supply, close the pressure gauge cock and, when there is no pressure in the line, remove the pressure gauge.
- Fit the plug to the pressure gauge cock and fit the pressure switch cover.
- Fully open the pressure gauge cock and fit the pressure switch cover.

SAX033 . . . . . Pressure switch for door seal steam. Hospital, general

Pressure switch, door seal pressure

A pressure switch with two electrical contacts as the activating devices senses the pressure in the door seal groove and closes the valves which admit steam, compressed air, gas etc. to the chamber in case the seal groove pressure should fall below prescribed value. With double ended sterilizers there is normally one pressure switch for both doors because these have a common pressure supply.

This is not the case with double-ended sterilizers with an SPF function, for which each door has its own pressure switch.
The pressure switch(es) interrupt(s) the electrical supply to the valves by means of auxiliary relay 1. The second contact (auxiliary relay 2) interrupts a signal to an input of the control system, generating an alarm. See the electrical circuit diagram in order to identify the components concerned.

SAX034 . . . . . Pressure switch for steam to gasket groove 2066.

Setting the pressure switch

1. Switch off the control unit power switch when the sterilizer is in stand-by mode.
2. Close the test pressure gauge cock of the seal groove and attach a mano-vacuummeter after the plug is removed. Remove the cover of the pressure switch.
3. Turn the pressure setting nuts clockwise until contact change over is heard.
4. Switch on the control unit power and start a process with prevacuum and steam as media to door seal.
5. Open the test pressure gauge cock slowly until the gauge indicates 1,6 bar(e).
6. Slowly turn the adjusting nut for the pressure switch contact group 2 anticlockwise until the input LED on the control unit goes out.

7. Open the test pressure gauge cock slowly until the gauge indicates 1.9 bar(e).
8. Acknowledge any alarm and restart the process.
9. When the chamber steam supply valve can be heard to have opened, and it can be seen that the pressure in the chamber is rising, turn the adjusting nut on the pressure switch contact group 1 slowly anti-clockwise until the steam valve closes.
10. Switch off the control unit power switch and close the test pressure gauge cock.
11. Refit the plug of test pressure gauge cock and the pressure switch cover when the pipes are at atmospheric pressure.
12. Open entirely the test pressure gauge cock, start the sterilizer, reset error message and end the process.

Safety check

1. Close the test pressure gauge cock of the seal groove and attach a mano-vacuummeter after the plug is removed. Remove the cover of the pressure switch.
2. Switch on the control unit power and start a process with prevacuum.
3. Open the test pressure gauge cock slowly until the gauge indicates 2,0 bar(e). This moment has to be executed within 10 minutes as otherwise an alarm is emitted.
4. Close the test pressure gauge cock and then check while the pressure decreases due to condensation that an alarm is emitted between 1,6 and 1,7 bar(e).

Cool the pipe with a wet rag to speed up condensation.

5. Open the test pressure gauge cock slowly until the gauge indicates 2,2 bar(e).
6. Acknowledge the alarm and restart the process.
7. When the sound indicates that the steam supply to the chamber has opened, and a pressure rise in the chamber can be observed, fully close the pressure gauge cock. Cool the pipe and check that the pressure is in the range 1.8 to 1.9 bar(e) when the sound indicates that the steam valve closes.
8. Switch off the power supply, close the pressure gauge cock and, when there is no pressure in the line, remove the pressure gauge.
9. Fit the plug to the pressure gauge cock and fit the pressure switch cover.

10. Open entirely the test pressure gauge cock, start the sterilizer, reset error message and end the process.

SAX035 . . . . . Pressure switch for door seal air supply, 2066

Adjustment

1. Turn off the mains power supply using the control power supply switch when the sterilizer is in the stand-by mode.
2. Reduce the air pressure in the seal groove using the reduction valve. Set the pressure to 1.6 bar(e).
3. Turn both pressure adjusting nuts of the pressure switch clockwise until the respective contacts can be heard to operate.
4. Turn on the power supply using the control power supply switch and start a sterilization program with pre-vacuum and steam as the sterilization medium.
5. Slowly turn the adjusting nut for the pressure switch contact group 2 anticlockwise until the input LED on the control unit goes out.
6. Slowly increase the air pressure to 1.9 bar(e).
7. Acknowledge any alarm and restart the process.
8. When the chamber steam supply valve can be heard to have opened, and it can be seen that the pressure in the chamber is rising, turn the adjusting nut on the pressure switch contact group 1 slowly anti-clockwise until the steam valve closes.
9. Reset the reduction valve to 2.5 bar(e) and conclude the process.
10. Refit the pressure switch cover.

Safety check

1. Start a steam sterilization process having a pre-vacuum stage.
2. Close the reduction valve slowly and check that an alarm is generated between 1.60 and 1.70 bar(e).
3. Slowly open the reduction valve until the pressure gauge shows 2.2 bar(e).
4. Acknowledge the alarm and restart the process.
5. When the chamber steam supply valve can be heard to have opened, and it can be seen that the pressure in the chamber is rising, close the reduction valve slowly. Check that the pressure lies between 1.8 - 1.9 bar(e) when the steam valve is heard to close.
6. Reset the reduction valve to 2.5 bar(e) and conclude the process.

SAM017 . . . . . Pressostat for seal air GEF-449 program F2901

Setting

1. Switch off the mains power supply with the operating switch when the sterilizer is in the standby position.

2. Reduce the air pressure in the seal groove using the reduction valve. Set the pressure 1.6 bar(e).
3. Turn the both pressure-adjusting nuts of the pressostat clockwise until the contacts concerned are heard to change.
4. Turn on the mains power supply with the operating switch and start a decontaminating process.
5. Slowly screw the adjusting nut belonging to the pressure monitor with contact mirror 2 anticlockwise until the LED of the control unit at the input goes out.
6. Slowly increase the air pressure to 1.9 bar(e).
7. Acknowledge any alarm and re-start the process.
8. When the sound indicates that the steam supply valve of the chamber has opened, and an increase in pressure in the chamber can be observed, screw the adjusting nut to the pressure monitor contact with contact mirror 1 slowly anticlockwise until the steam valve closes.
9. Re-set the reduction valve to 2.5 bar(e) and terminate the process.
10. Fit the cover of the pressure monitor.

Safety check

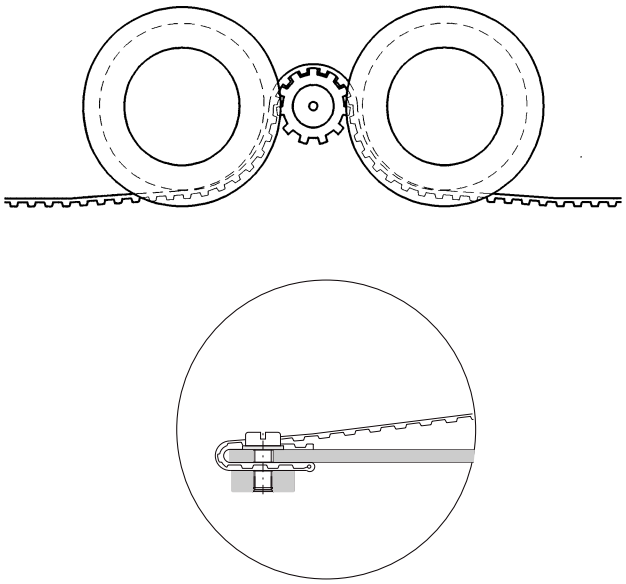
1. Start a decontamination process.
2. Close the reduction valve slowly and check that an alarm is obtained between 1.60 and 1.70 bar(e).
3. Slowly open the reduction valve until the pressure gauge shows 2.2 bar(e).
4. Acknowledge the alarm and re-start the process.
5. When the sound indicates that the steam supply valve of the chamber has opened, and an increase in pressure in the chamber can be observed, close the reduction valve slowly. Check that the pressure is between 1.8 - 1.9 bar(e) when the sound indicates that the steam valve closes.
6. Re-set the reduction valve to 2.5 bar(e) and terminate the process.

SAH016 . . . . . Horizontally moving sliding door

Timing belt replacement

Fit the new belt somewhat slackened so as to enable for the pneumatic motor to overcome its static friction when starting up without moving

the heavy door. Rollers pressing the belt towards the pulley prevents the belt to unmesh in spite of being slackened.



Double the belt to get a softer bend radius and reduce the risk of wear.

Safety blocking of the start function and the medium admittance to chamber

The horizontally sliding sterilizer door is capable to resist chambe pressure only when the door is completely closed so that the bolts are in safe engagement. Steps have therefore been taken which in two different ways prevent admittance of any medium to the chamber or the door seal groove until the door is completely closed.

Conditions A and B below has to be fulfilled before the door seal groove can be pressurized. Conditions B and C below has to be fulfilled before valves letting media in to the chamber can be opened.

A **DOOR LOCK**
When the door is completely closed, a mechanical lock will block the door in closed position. This lock activates a pneumatic limit switch, which makes it possible to pressurize the groove behind the door seal.

B **LIMIT SWITCH**
An electric limit switch with safety requirements is activated when the door is completely closed. The switch indicates to the control unit that the first condition needed to open the media valves is fulfilled and enables for the valve letting medium into the door seal grove to be opened. The same limit switch puts on an alarm if the door should move in the opening direction after a process is started.

C **DOOR SEAL GROOVE PRESSURE**
The door seal has to be pressurized before operation which is detected by a pressure switch.
Sterilizers having two doors usually have one pressure switch common to both grooves. Some special applications have pressure switches on each door seal groove. For further information, see the P&I diagram and the electric wiring diagram.

Safety check, door lock and pneumatic limit switch

1. Check that all components are rigidly attached.
2. By actuating the cylinder, check that the roll of the door lock lifts 1-2 mm above the door plane top. This can be adjusted by the threaded piston of the cylinder.
3. Close the door. Check that the roll of the lock turns smoothly on the door plane top. Also check that it easily falls down behind the door, when the door is completely closed. The distance between door and roll, when the door is closed, shall be 1-2 mm.
4. Check the condition of the pneumatic limit switch. Lift the latch bolt of the door lock and let it fall back into closed position. The arm of the limit switch shall smoothly follow the lock.
5. Check that the pneumatic limit valve shuts off the air flow before the latch bolt is lifted to half its diameter above the door plane top.
6. Open the door and close it again.
7. When the door closes, keep the door lock in its upper position. The door seal groove shall not be pressurized.
8. Keep the door lock in its upper position and try to start a process. No process shall start.
9. Release the door lock. The door seal groove shall now be pressurized.

Safety check, electric limit switch

A Check that the limit switch and its lever are rigidly attached

B When operating the door, check that the lever turns smoothly and without jerks.

Safety check, door seal groove pressure switch

A pressure switch senses the pressure in the seal groove and breaks the connection with those valves which control the admittance of steam,

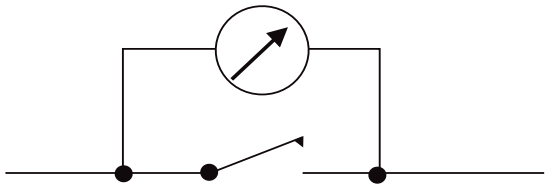
compressed air, water and gases whenever the seal groove pressure falls below the prescribed one.

With double door sterilizers there is normally one common pressure switch for both sides since these are fed parallel.

For double ended sterilizers, with SPF-function, there are always two pressure switches, one for each door. Consult the circuit diagram if in doubt regarding the number of switches.

SAX006 . . . . . Steam behind the door seal

- Check the P&I diagram to identify and the pressure switch(es) for the door seal groove(s).
- Start a process.
- Stop the process, with the main power switch, when full pressure is reached in the seal groove.
- Connect a measuring device (Ohm-meter) over the connection points of the pressure switch.

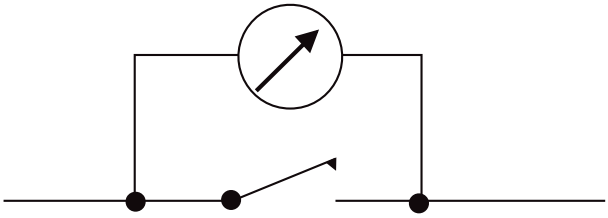


- Keep the sterilizer with the main power switch switched off. Due to condensation of steam, the pressure in the groove will decrease.
- Note the pressure at which contact change-over takes place. Right value shall be 1,9 bar(e) ± 0,1.
- If required, adjust the pressure switch. Consult, if necessary, the description of the switch in chapter Components.
- After the check, disconnect the measuring device.
- Switch the main power on and end the process (See section ”Alarm” in chapter OPERATION in the USER MANUAL).

SAX026 . . . . . Steam behind the door seal. Fixed pressure switch

- Check the P&I diagram to identify and the pressure switch(es) for the door seal groove(s).
- Start a process.
- Stop the process, with the main power switch, when full pressure is reached in the seal groove.

- Connect a measuring device (Ohm-meter) over the connection points of the pressure switch.



- Keep the sterilizer with the main power switch switched off. Due to condensation of steam, the pressure in the groove will decrease.
- Note the pressure at which contact change-over takes place. Right value shall be 1,7 bar(e) ± 0,15.
- If required, replace the pressure switch. Consult, if necessary, the description of the switch in chapter Components.
- After the check, disconnect the measuring device.
- Switch the main power on and end the process (See section ”Alarm” in chapter OPERATION in the USER MANUAL).

SAX007 . . . . . Air behind the door seal. NOT GEE low pressure process

- Check the P&I diagram to identify the reduction valve and the pressure switch(es) for the door seal groove(s).
- Adjust the pressure reduction valve, for seal groove, to 1,6 bar(e).
- Select a process and press the start button. The process must not start, as the groove pressure is to low.
- Slowly increase the pressure at the pressure reduction valve, until the process starts.
- Check the pressure in the groove.
- The reading shall be 1,9 bar(e) ± 0,1.
- If required, adjust the pressure switch. Consult, if necessary, the description of the switch in chapter Components.
- After the check, reset the pressure reduction valve to 2,5 bar(e) and end the process.

SAX027 . . . . . Air behind the door seal. NOT GEE LP process. Fixed press. switch.

- Check the P&I diagram to identify the reduction valve and the pressure switch(es) for the door seal groove(s).
- Adjust the pressure reduction valve, for seal groove, to 1,6 bar(e).
- Select a process and press the start button. The process must not start, as the groove pressure is to low.
- Slowly increase the pressure at the pressure reduction valve, until the process starts.

- Check the pressure in the groove.
- The reading shall be 2,0 bar(e) ± 0,15.
- If required, replace the pressure switch. Consult, if necessary, the description of the switch in chapter Components.
- After the check, reset the pressure reduction valve to 2,5 bar(e) and end the process.

SAX025 . . . . . Air behind the door seal. GEE low pressure process.

- Check the P&I diagram to identify the reduction valve and the pressure switch(es) for the door seal groove(s).
- Adjust the pressure reduction valve, for seal groove, to 0,2 bar(e).
- Select a process and press the start button. The process must not start, as the groove pressure is to low.
- Slowly increase the pressure at the pressure reduction valve, until the process starts.
- Check the pressure in the groove.
- The reading shall be 0,5 bar(e) ± 0,1.
- If required, adjust the pressure switch. Consult, if necessary, the description of the switch in chapter Components.
- After the check, reset the pressure reduction valve to 1,0 bar(e) and end the process.

SAX008 . . . . . General

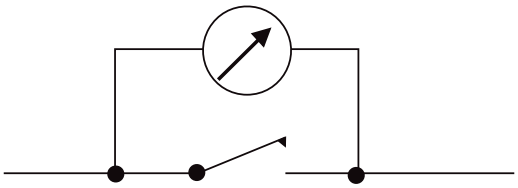
Safety blocking of the door opening

Before any door is allowed to open, a pressure switch has to verify that there is no pressure in the chamber. This pressure switch is independent from the control system.

Safety check, chamber pressure switch

- Check the P&I diagram and identify the ”Chamber Pressure Switch”
- Start a process.
- Stop the process, by using the Emergency Stop-button, when the chamber has a pressure of about 0,3 bar(e).

- Connect a measuring device (Ohm-meter) over the connection points of the pressure switch.



- Keep the sterilizer with the Emergency Stop-button pushed. Due to condensation of steam, the pressure in the chamber will decrease.
- Check the pressure in the chamber, by using the display of the control system. Note the pressure at which contact change-over takes place. Correct value shall be within 0,08-0,15 bar(e)
- If required, adjust the pressure switch. Consult, if necessary, the description of the switch in chapter Components.
- In order to get a faster pressure decrease, a small drain valve can manually be activated.

SAX009 . . . . . GEC

NOTE! Don't drain the process water. Use the upper discharge valve!

SAX010 . . . . . General

- After the check, disconnect the measuring device.
- Reset the Emergency Stop-button and end the process (See section ”Alarm” in chapter OPERATION in the OPERATOR MANUAL).

SAX018 . . . . . Blocking the door motion and the door seal mediums. GE 2044

Blocking the door motion and the door seal mediums

The supervisory system is doubled:

1. Through the hardware, with a pressure switch sensing the pressure in the chamber. The contacts of the pressure switch break the connection between the control system and the devices that control the door and door seal outlet, as long as the pressure in the chamber is higher than atmospheric pressure.
2. **Through the software** by enabling for the door to be operated only in the phase “Stand by” i.e. before a process is started and when it is completed.

Setting the pressure switch for external blocking

- The setting is done with the sterilizer in stand-by mode. The pressure switch is marked PS12 or PS21, depending on the sterilizer model. The external blocking is at contact interface 1 (PS12/1 or PS21/1, as appropriate).
- Switch on the operating voltage and check for voltage at terminal 107. If voltage is present, turn the adjusting nut of PS12/1 or PS21/1 clockwise until the voltage at terminal 107 disappears.
- Slowly turn the adjusting nut anticlockwise until the voltage returns to terminal 107, then turn the nut a further quarter-turn anticlockwise.

Safety check

- Start a process.
- Check that voltage disappears from terminal 107 before the chamber pressure reaches 0.2 bar(e).

SAX036 . . . . . Safety interlocking, general

Safety interlocking of the door opening

The safety interlocks to prevent the door opening are duplicated, split between the control system and an independent supervisory system. The safety criteria of both systems must be fulfilled before the door can be opened.

SAX043 . . . . . Safety blocking cont.

For the sterilization of liquids, see also the section headed "Safety blocking of the door in liquid sterilization" in the chapter on HINTS AND INSTRUCTIONS.

SAX037 . . . . . Safety interlocking, external pressure switch, 2066

Independent pressure switch

Adjustment

Adjust the pressure switch with the sterilizer in the stand-by mode. The pressure switch for chamber pressure is easy to identify on the electrical circuit diagram sheet for safety interlocks, where the external interlock is routed through auxiliary relay 1.

1. Turn on the control power supply and check whether terminal number 5027 is live. If it is, screw in (clockwise) the adjusting nut for the pressure switch group 1 until the terminal is de-energised.

2. Slowly screw out (anticlockwise) the adjusting nut until terminal 5027 is again energised, and then turn the nut through a further quarter turn anticlockwise.

Safety check

1. Start a process.
2. Check that terminal number 5027 is de-energised before the chamber pressure has reached 0.2 bar(e).

SAX038 . . . . . Safety interlocking, Supervisor 2 and 3

Supervisor

Adjustment
The safety interlocking provided by the Supervisor is not adjustable, as the pressure limits for allowing the door to open are programmed in the software. The system uses its own pressure transmitter: however, a faulty or incorrectly calibrated transmitter can threaten the integrity of interlocking.

Safety check

1. Start a process.
2. Check that terminal number 5027 is de-energised when the chamber pressure exceeds 0.2 bar(e) or is lower than -0.2 bar(e). Read off all the values on the *control system display and not on the Supervisor system display*. If the values are read off from the PACS Supervisor, it will not be possible to determine whether the system needs to be calibrated or not.

NB: There may be a few seconds' delay in the readings between the PACS Supervisor and the PACS 2000 control system.
Calibrate the supervisory system sensor if necessary.

SAX019 . . . . . Adjusting the pressure switch for software blockage. GE 2044

Setting the pressure switch for software blocking

- This setting is done with the sterilizer in stand-by mode and with the operating voltage on.
- The pressure switch is marked PS10. At positive pressure, contact interface 1 (PS10/1) opens. At negative pressure, contact interface 2 (PS10/2) opens.
- Turn the adjusting nut on PS10/1 clockwise until the LED at input 1116 goes out. The easiest way to identify the LED, which is

mounted on the base card directly adjacent to the cable connection, is by means of the cable marking.

- Slowly turn the adjusting nut anticlockwise until the LED goes out, then turn the nut a further quarter-turn anticlockwise.
- Turn the adjusting nut on PS10/2 anticlockwise until the LED at input 1118 goes out.
- Slowly turn the adjusting nut clockwise until the LED lights up, then turn the nut a further quarter-turn clockwise.

Safety check

- Choose menu 8600 “Test of digital input” (see “Control system PACS 2000”).
- Choose the menu display that shows DI 11. Start a program with pre- and post-vacuum and check that the input is not activated until the pressure in the chamber is -0.1 bar(e) or higher.
- Choose the menu display that shows DI 10 and check that the input is not activated until the pressure in the chamber is +0.1 bar(e) or lower.

Note than certain menus on this level contain options that can disable the control and safety functions of the sterilizer. Study the chapters about the control system in the manual.

SAX039 . . . . . Adjusting the pressure switch for software interlocking

Pressure switch for software interlocking

Adjustment

Adjust the pressure switch with the sterilizer in the stand-by mode and with the control power supply turned on. The pressure switch for chamber pressure is easy to identify on the electrical circuit diagram sheet for digital inputs, where the interlocking for positive pressure is routed through contact group 1 and the interlocking for negative pressure is routed through contact group 2. Each of the contact groups is connected to its own digital input.

1. Turn the adjusting nut on contact group 1 (positive pressure) of the pressure switch clockwise until the LED at the input goes out. The easiest way to identify the LED, which is fitted to the base card immediately adjacent to the cable connection, is by means of the cable marking.
2. Slowly turn the adjusting nut anticlockwise until the LED goes out, then turn the nut a further quarter-turn anticlockwise.

3. Turn the adjusting nut on the pressure switch group 2 (negative pressure) anticlockwise until the LED at the input goes out.
4. Slowly turn the adjusting nut clockwise until the LED lights up, then turn the nut a further quarter-turn clockwise.

Safety check

1. Select the “Test functions, digital input” menu (see the PACS 200 CONTROL SYSTEM chapter).
2. Select the menu display that shows the negative pressure input. Start a program with pre-vacuum and post-vacuum and check that the input is not activated until the pressure in the chamber is -0.1 bar(e) or higher.
3. Choose the corresponding menu display that shows the positive pressure input, and check that the input is not activated until the pressure in the chamber is +0.1 bar(e) or lower.

Note than certain menus on this level contain options that can disable the control and safety functions of the sterilizer. Study the chapters about the control system in the manual.

SAX040 . . . . . Software interlocking, control system

The control system

Adjustment

The safety interlocking provided of the control system is not adjustable, as the pressure limits for allowing the door to open are programmed in the software. The system uses its own pressure transmitter: however, a faulty or incorrectly calibrated transmitter can threaten the integrity of interlocking.

Safety check

1. Open the door and check that the pressure displayed on the control system operators panel is zeroed.
2. During a sterilization process, check that the pressure display accords with the pressure shown on the Chamber pressure vacuum gauge. An exact comparison is difficult, due to the major difference in resolution and accuracy.

If the display is incorrect, the calibration of the pressure transmitter should be checked.

SAM012 . . . . . Position of closed door. GE 2044

Position of closed door

Position- and safety check

1. Close the door and lift it up to the rubber-cushions.
2. Check the space between door lock and door. This space shall be 2-5 mm when the door is pressed against the rubber-cushions.
3. When needed, adjust the space by adjusting the two rubber-cushions equally.

Indication of closed door.

When the door is closed, a limit switch with forced breaking closes. This limit switch is a safety-component. Only when the limit switch is activated a sterilization cycle can be started.

For safety reasons, the limit switch isn't adjustable.

Safety check

1. Slowly close the door and check that the “Door closed” LED on the operator panel lights up at the earliest 2 mm before, and at the latest 2 mm after the closing position in which the door latch is fully engaged under the door.
2. Check that the limit switch that monitors the door latch is securely fixed and that it is not worn or damaged.

SAM013 . . . . . Blocking of door lock during operation. GE 2044

Blocking of door lock during operation

A device, controlled by an electrical motor or a pneumatic cylinder, blocks the manoeuvring of the door opening-knob during operation of the sterilizer.

Safety check
Check, during operation of the sterilizer, that the door opening-knob can't be pushed. Check the condition of the bolted connection and wear.

Beware of the danger of squeezing, while manipulating the door lock.

SAX020 . . . . . Supervisor

Safety blocking of the door opening

Before any door is allowed to be opened, the PAC SSupervisor has to verify atmospheric pressure in the chamber. The Supervisor is independent from the control system.

An OK from the Supervisor is indicated by DO64 on the Supervisor DO_board. The DO64 is activated when chamber pressure is between 0.8 and 1.2 bar(a) (about ±0,2 bar(e)).
See the electrical diagram.

SAX021 . . . . . Releasing the door lock. Other than GEC-units

To release the independent door interlock, also the load temperature has to be at a safe level. This is indicated by DO 66 on the Supervisor PCB.

The DO 66 is also a condition for ending the cooling in the sterilizer. When DO 66 is set one of several conditions to end the cooling has been met.

During a cycle for sealed containers having reinforced cooling the DO66 is set when the temperature is below 80°C.

During a cycle for open containers having natural cooling or cooling by means of pressure decrease, the DO66 is set when the temperature drops below 95°C.

SAX041 . . . . . Releasing the door latch. Non-GEC sterilizers.

Before the independent door locking can be released, the temperature of the load must have fallen to a safe level. This is handled by DO68 on the DO circuit board of the monitoring system which resets relay KL68. Relay KL68 is energized when the valve(s) for heating the chamber open.

Activation of DO68 also means that one of the conditions for ending cooling has been met.

During a process intended for closed containers, DO68 is activated when the temperature falls below 80 ^{o}C.

During a process for liquids in open containers and where the goods are left to self-cool, or where the goods are cooled by pressure reduction, DO68 is activated when the temperature falls below 95 ^{o}C.

SAX022 . . . . . Releasing the door lock. GEC-units

To release the independent door interlock, also the load- and process water temperatures have to be at a safe level. This is indicated by DO66 (load temp) and DO68 (process water temp) on the Supervisor PCB.

The DO66 and DO68 are also a conditions to end the cooling. When both DO66 and DO68 are set one of several conditions to end the cooling has been met.

During a cycle for sealed containers having reinforced cooling, the DO66 is activated when the temperature drops below 80°C.

During a cycle for open containers having natural cooling or cooling by means of pressure decrease, the DO66 is set when the temperature drops below 95°C.

The DO68 is activated, when running a cycle for sealed containers and enforced cooling, when the temperature is below 55°C.

SAX042 . . . . . Releasing the door latch. GEC sterilizers.

Before the independent door locking can be released, the temperature of the load and of the process water must have fallen to a safe level. This is handled by DO68 (load temperature) and DO69 (process water temperature) on the DO circuit baord of the monitoring system which resets relay KL68. Relay KL68 is energized when the valve(s) for heating the chamber open.

Activation of DO68 and DO69 also means that one of the conditions for ending cooling has been met.

During a process intended for closed containers, DO68 is activated when the temperature falls below 80 ^{o}C.

During a process for liquids in open containers and where the goods are left to self-cool, or where the goods are cooled by pressure reduction, DO68 is activated when the temperature falls below 95 ^{o}C.

DO69 is activated when, during a process that includes forced cooling, the temperature of the process water, falls below 55 ^{o}C.

SAX023 . . . . . Safety check

Safety check

Check, during a standard cycle, that the DO(s) on the Supervisor board is / are switching on and of as described. Read the values from the display of the control system, not the display of the Supervisor. If you use the Supervisor display you will not be able to see if the system requires calibration.

(Note: there can be some seconds delaying readings between the Supervisor and the PACS 2000 control system)
If necessary, calibrate the Supervisor-sensors.

SAX013 . . . . . General, Not GEE

Emergency stop button

When the emergency stop button is activated following functions are blocked:

- Media to chamber.
- Air supply for opening and closing door.

Further, the control system will enter the alarm phase.

Safety check

A Open a door. While the door is moving, press the emergency stop button. The door shall stop and the control system give an alarm. Reset the alarm and reset the emergency stop button. Open the door by pressing the ”open door” button.

B Close the door and start a sterilizing cycle.

C Press the emergency stop button when steam is entering the chamber. The steam valve shall close and the system shall go into the alarm-phase. The printer (if connected) prints ”Process Stop” and the stop is indicated on the display of the control system.

D Reset the alarm and reset the emergency stop button.

E End the sterilization cycle.

In case above described functions doesn't work according to the description, let a well trained technician check the system.

SAX014 . . . . . Emergency stop, 2-doors

F Make above safety check also for emergency stop button at the second door.

VAX037 . . . . . Illustration on drawings

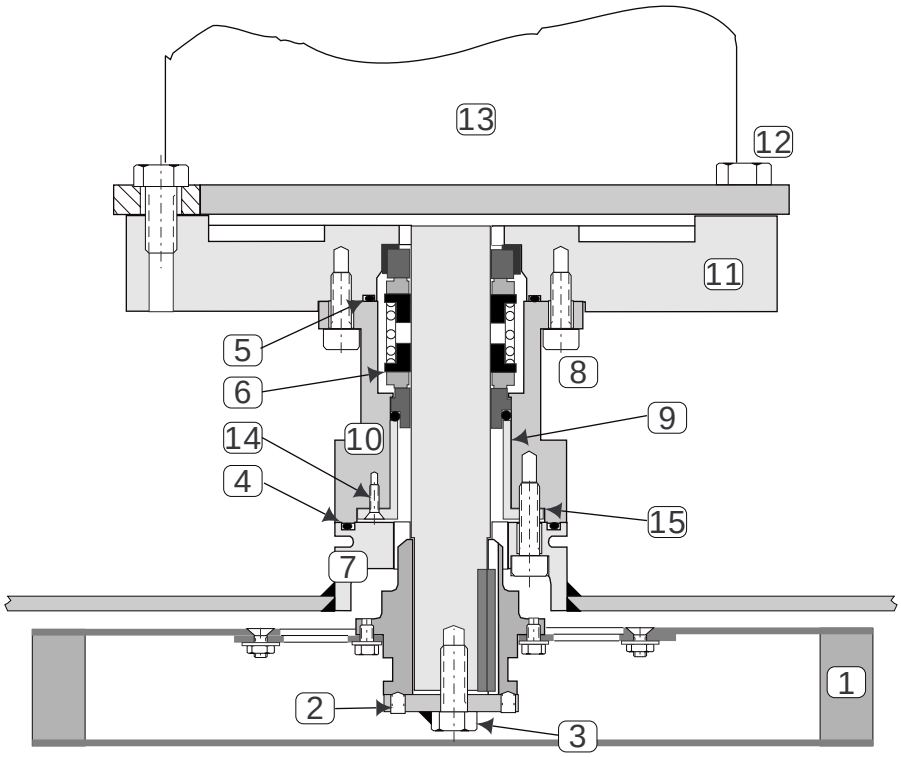
Illustration on drawings

- Electric wiring diagrams are drawn with power off.
- Apparatus and components are illustrated in their basic position.
- Pressure switches are illustrated in the position they take for atmospheric pressure.
- Thermal switches are illustrated in the position they take for room temperature.

Departure from these rules are indicated on the diagrams.

Replacement of fan seal

Switch off mains at the safety switch and lock.

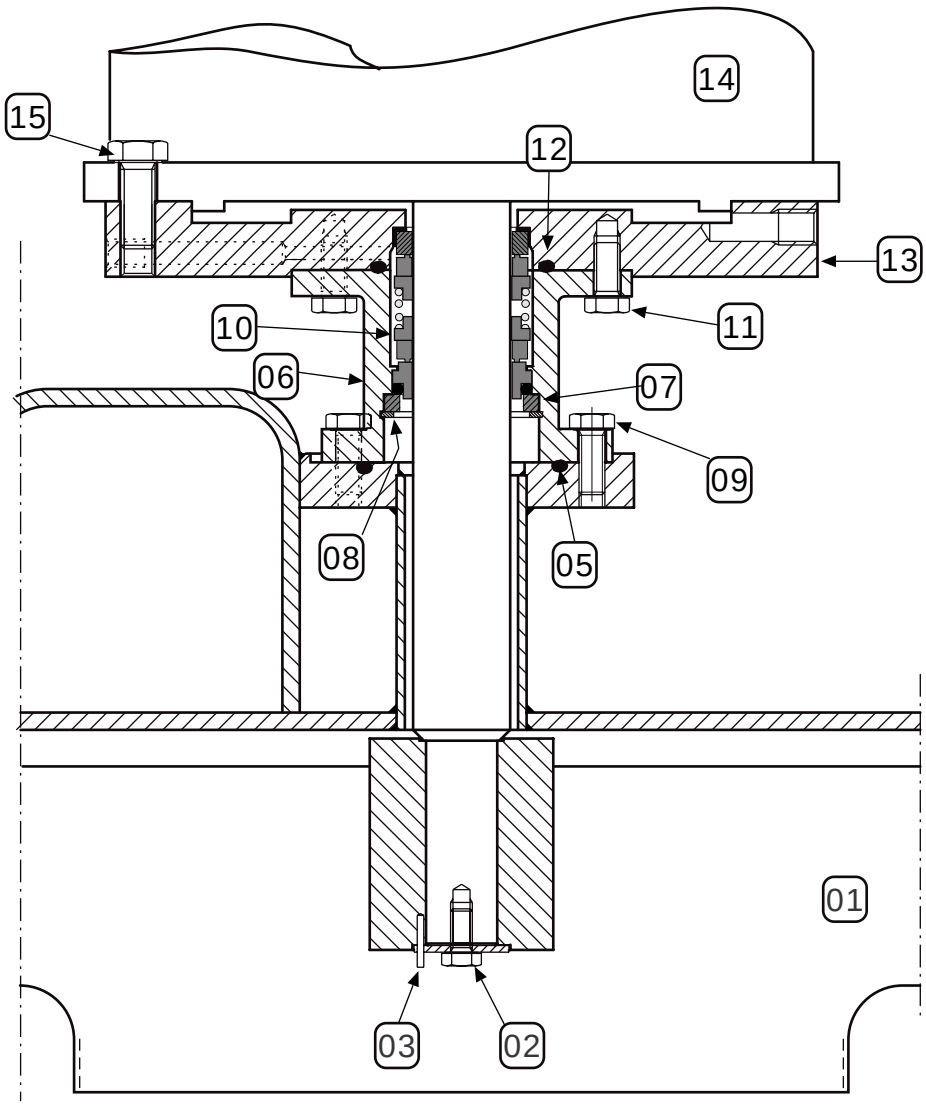


Removal

1. Remove all pipes connected to the motor plate (11) of the fan.
2. Disconnect the electrical connections to the motor (note the conductor markings).
3. Remove the screw (2) and the fan (01) from the motor shaft. Where there is a roll pin (3), remove this first.

Replacement of fan seal

Switch off mains at the safety switch and lock.



Removal

1. Remove all pipes connected to the motor plate (13) of the fan.
2. Disconnect the electrical connections to the motor (note the conductor markings).

3. Remove the roll pin (03), the screw (02) and the fan (01) from the motor shaft.

VAX058 . . . . . GEV-900 fan and fan 150

When removing/installing the impeller, bear in mind the weight of the impeller. The impeller weighs about 8 kg.

VAX059 . . . . . GEV-1250 fan and fan 200

When removing/installing the impeller, bear in mind the weight of the impeller. The impeller weighs about 25 kg.

VAX060... . . . . Replacement of fan seal. All GEV

4. Remove the screws (15) which secure the seal housing (10) at the chamber and lift off the motor (13) together with the seal housing (10).
5. Loosen the screws (14) and remove the spacer sleeve/washer (9) which holds down the lower seal.
6. Remove the remaining screws (8) and (12). Prise the motor away from the motor plate with a pair of sturdy screwdrivers applied symmetrically between motor and plate. Taking care not to damage the shaft, carefully cut away the bellows of the fan seal if it has become stuck on the shaft. When removing/installing the motor, bear in mind its weight. The weight of the motor is shown on the installation drawing.
7. Press or, if necessary, chip away the parts of the fan seal from the seal housing (10) and the fan motor plate (11).
8. Clean the fan shaft and seal seats to remove any residue of rubber. Change the O-rings between the separated seal parts.

Installation

1. Lubricate all rubber parts with a solution of soft soap in water.
2. Press the upper seal into the motor plate (11) and check that it reaches the bottom of the seating.
3. Fit the lower part of the seal to the seal housing and secure it with the spacer sleeve/washer (9). NOTE: The O-ring of the sealing part must be turned towards the spacer sleeve/washer. Secure the sleeve/ washer with the screws (14).

4. Mount the fan motor plate (11) on the motor and tighten the screws (12).
5. Carefully slide the rotating part of the fan seal on to the motor shaft (using plenty of soft soap solution).
6. Using a new O-ring (5), install the seal housing (10) and secure the housing with the screws (08).
7. Place the O-ring (4) in the groove in the fan spigot.
8. Mount the fan unit on the chamber and secure it with the screws (15) from inside the chamber.
9. Install the impeller (1) and the locking bolt (2).
10. Fit the fixing part (3) (roll pin or locking screw).
11. Connect the sealing water inlet and outlet and the drain connection.
12. Connect the electric cables of the motor. The fan may be hard to turn even with the seal correctly fitted.

Spare parts:

Motor (see wiring diagram)	Reconditioning kit 04+05+06	Sterilizer chamber
470 59 38	561 22 52-71	Rectangular
470 59 38	560 98 65 71	Cylindrical
470 81 27	561 04 32-71	Rectangular
470 81 27	479 55 89-71	Cylindrical
479 01 26	561 01 45-72	----
479 58 68	560 98 65 71	----

Roll pin (3): 721 42 12-40
or locking screw (3): 728 93 62-40

VAX065... . . . . Replacement of fan seal system 150 & 200 (ctnd.)

13. Remove the screws (09) which secure the seal housing (06) at the chamber and lift off the motor (14) together with the seal housing (06).

When removing/installing the motor, bear in mind its weight. The weight of the motor is shown on the installation drawing.

14. Remove the retaining ring (08) and remove the spacer washer (07) which holds down the lower seal.

15. Remove the remaining screws (11) and (15). Prise the motor away from the motor plate with a pair of sturdy screwdrivers applied symmetrically between motor and plate. Taking care not to damage the shaft, carefully cut away the bellows of the fan seal if it has become stuck on the shaft.
16. Press or, if necessary, chip away the parts of the fan seal from the seal housing (06) and the fan motor plate (13).
17. Clean the fan shaft and seal seats to remove any residue of rubber. Change the O-rings between the separated seal parts.

Installation

1. Lubricate all rubber parts with a solution of soft soap in water.
2. Press the upper seal into the motor plate (13) and check that it reaches the bottom of the seating.
3. Fit the lower part of the seal to the seal housing and secure it with the spacer washer (07). NOTE: The O-ring of the sealing part must be turned towards the spacer washer. Secure the washer with the retaining ring (08).
4. Mount the fan motor plate (13) on the motor and tighten the screws (11).
5. Carefully slide the rotating part of the fan seal on to the motor shaft (using plenty of soft soap solution).
6. Using a new O-ring (12), install the seal housing (06) and secure the housing with the screws (15).
7. Place the O-ring (05) in the groove in the fan spigot.
8. Mount the fan unit on the chamber and secure it with the screws (09).
9. Install the impeller (01) and the locking bolt (02).
10. Fit the roll pin (03).
11. Connect the sealing water inlet and outlet and the drain connection.
12. Connect the electric cables of the motor.

The fan may be hard to turn even with the seal correctly fitted.

Spare parts:

Motor (see wiring diagram)	Reconditioning kit 05+10+12
479 01 26	562 59 15-72
470 81 27	561 04 32-71

Roll pin (3): 721 42 12-40

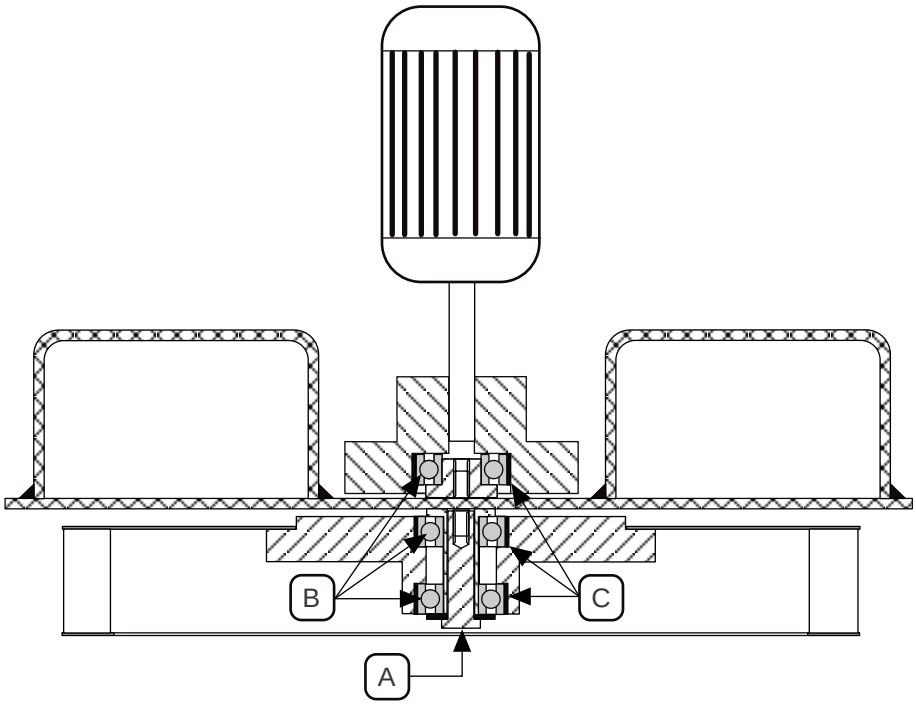
VAX101 . . . . . Magnet driven fan

Magnet driven fan

The unit consists of a motor part, which is installed outside the chamber, and a fan part which is installed inside the chamber. The motor part and fan part are fixed in the roof of the chamber using welding screws. The two parts are coupled together by a magnetic coupling, which means that there is no need for a hole for the shaft to pass through in the roof of the chamber.

The fan is protected inside the chamber by a roof panel. Because of the magnetic forces and the warm moist environment, the bearings are provided with a specially designed driver and lubricated with high-temperature grease approved for food use.

Changing fan bearings:



N.B.: The strength of the magnetic force between the outer and inner halves of the coupling is such that account must be taken of it in all handling in order to avoid damage.

13. Slacken the screws securing the roof panel and lift it off.
14. Slacken the screw securing the fan. “A” (10 mm spanner)
15. Take off the fan part.
16. Replace the 2 old bearings “B” with new ones (article no.: 563 26 11-70). Also replace tolerance rings “C” (article no. 570 05 48-01). A puller may be required to remove old bearings.
17. Replace the fan part. Take account of the magnetic forces, which will pull the fan up towards the roof.
18. Tighten the securing screw.
19. Re-fit the roof panel.

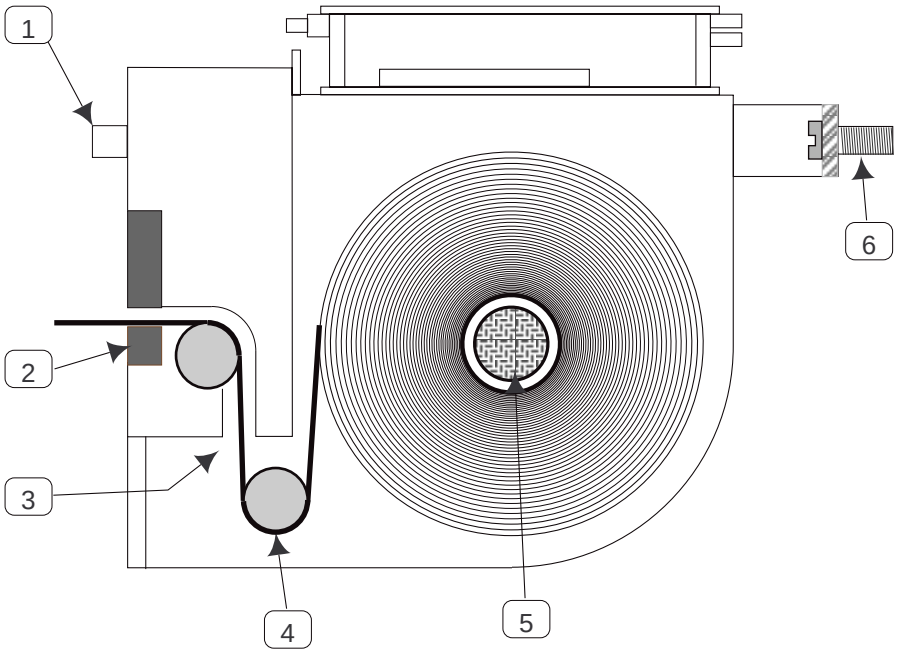
Printer 479 39 88

Paper loading

Use only 57 - 58 mm (2 1/4”), wood free, high quality paper with maximum roll diameter 50 mm.

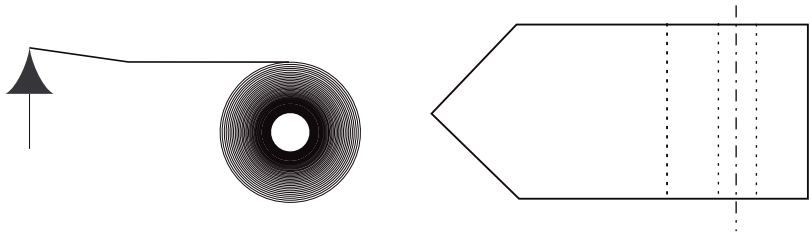
Take care that paper changing is not carried out under circumstances subject to static electricity. Touching the micro processor chip or leads, connector contacts etc. of the printer under very adverse conditions could cause damage to it.

- Switch off host system and disconnect from mains.
- Push the printer door right side inwards about 5 mm and release. Swing out and remove the hood holding wing nut on screw 5, and the hood.
- Unscrew the knurled thumb screw and withdraw the paper pivot bar 5. Discard any old paper and the card board roller.



- Place the roll in the paper holder and insert paper pivot 5 through centre, as shown in the figure. Fasten the knurled nut finger tight only.

- Straighten by hand the first 20 mm of the paper, opposite way to the way it is rolled. Bend paper over the paper guide 4 and push it upwards through the slot 3 as far as it goes.



- Refit the hood and attach with the wing nut. Close the door by pushing the printer door right side inwards about 5 mm and release.
- Switch on the control unit main switch and push the FEED button 1 to make the printer feed paper. Check that the paper emerges correctly from the aperture.

Ribbon cartridge replacement

After several paper rolls have been used, the ribbon cartridge will need replacement.

- Switch off host system and disconnect from mains.
- Push in the printer door right side about 5 mm and release. Swing out and remove the hood holding wing nut on screw 6, and the hood.
- Remove the printer from the door plate by screwing, through the holes, the two pozidrive screws a number of turns in the direction **for ordinary tightening,** and loosen the screw holding the top bracket. It is not necessary to remove paper or electric connectors.
- Taking note of ribbon and paper arrangement, pull the inked ribbon cartridge 2 straight out and discard.
- Insert replacement cartridge 2, tension ribbon if necessary by turning knurled wheel on cartridge.

Refit dismantled parts in reverse order.

VAX070 . . . . . Thermal printout, USA-developed

Panel-mounted printer

The Getinge panel printer is a completely maintenance-free therma printer, specially developed to withstand the severe conditions associated with front mounting. The thermal paper has been specially developed for the Getinge panel printer in order to withstand particularly

severe requirements in respect of heat resistance, resistance to fading and permanent documentation.

Loading the paper

Use only genuine Getinge paper for the best printout durability.

The thermal paper is of high quality, supplied on 50 mm diameter rolls with a width of 60 mm.

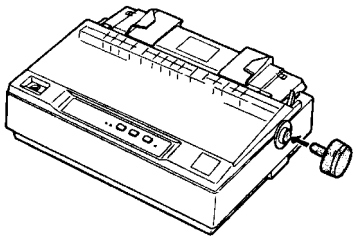
Do not replace the paper without being properly earthed. If not, static electricity can destroy the microprocessor if you touch it, or any of the connections.

- Turn off the control unit power supply switch. The printer lamp goes out.
- Pull the upper edge of the transparent paper collector outwards in order to release it.
- Release the black printer cover in the same way and remove the old paper roll.
- Load a new roll of paper with the tongue upwards, as shown in the figure. This will automatically position the recording side correctly in the printer.
- Position the roll correctly, pull out some of it and close the printer cover so that it clicks into position.
- Turn on the sterilizer control power supply switch and feed out about 10 mm of paper using the paper feed push-button on the printer. Check that the paper is being fed correctly through the opening in the printer cover.
- Lift the paper collector into position. The printer is ready for use.

Printer Epson LX 300

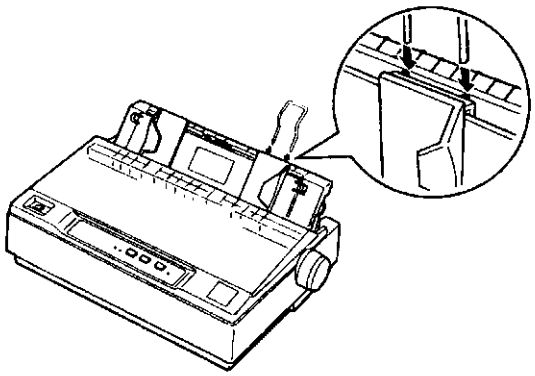
Unpacking and setting up the printer

Fitting the knob



1. Press the knob into the hole on the right-hand side of the printer and turn it slowly until it is secure on the shaft.
2. Firmly press the knob in towards the printer housing.

Fitting the paper support



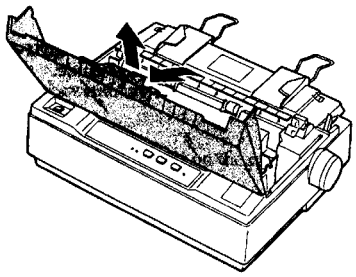
1. Tilt up the paper guide. Firmly hold one of the edge guides and insert the paper support in the recesses as shown above.
2. Do the same thing with the other edge guide, then lower the paper guide.

Fitting an ink ribbon.

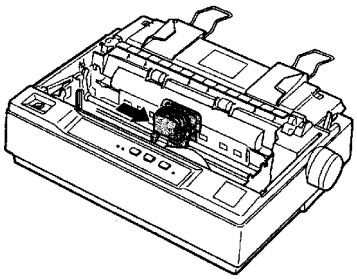
Unplug the printer from the mains power before starting work.

Do not touch the print head immediately after it has been printing.
Let it cool for a few minutes first.

1. Open and remove the printer cover by first tilting it up and then lifting it straight upwards.



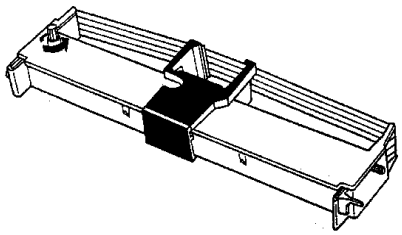
2. Move the print head to the middle of the platen.



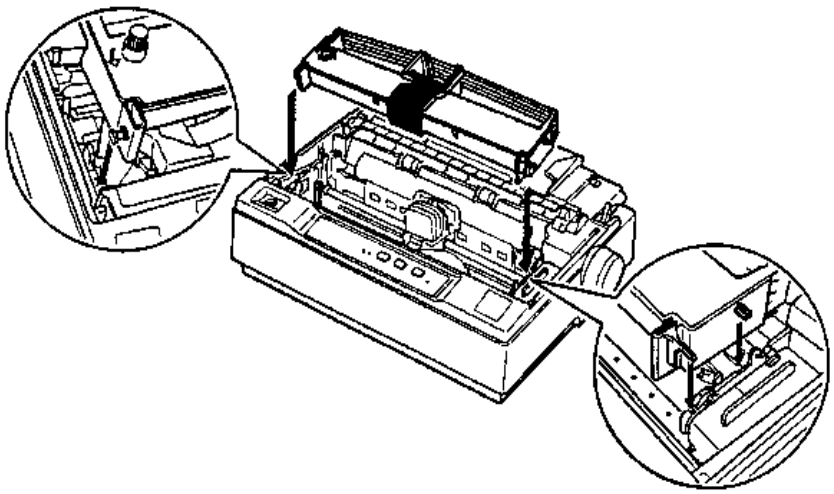
Do not move the print head when the power is on. Doing so may damage the printer.

3. Move the plastic part marked in black on the illustration below, to the middle of the tape ribbon cassette.

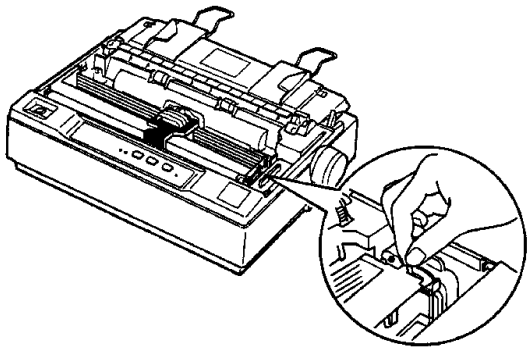
4. Tension the ribbon by turning the knob on the tape cassette in the direction of the arrow (anticlockwise).



5. Load the cassette as shown in the illustration below.



6. Firmly press down the short sides of the ribbon cassette so that the hooks on the cassette engage with the recesses on the printer.
7. Turn the knob on the ribbon cassette in the direction of the arrow so that the ribbon takes up the correct position. The ribbon must not be twisted or creased.



8. Refit and closer the printer cover.
9. Run a self-test (see page 577) to check that the ribbon is correctly set.

10. If the upper or lower edges of the characters printed appear in a different colour, the angle of the ribbon must be adjusted.
    - Check the red characters. If they are blue at the top, move the ribbon adjusting lever forwards.
    - If the red characters are yellow at the bottom, move the lever backwards.
11. Start a new self-test to check the ribbon. If necessary, adjust again.
12. Repeat until the tape is correctly adjusted.

When the printouts start to appear faint, the ink ribbon needs changing.

The ordering number of the ink ribbon is 570 02 21-02.

Removing the old ink ribbon cassette

See the warnings at the beginning of this section.

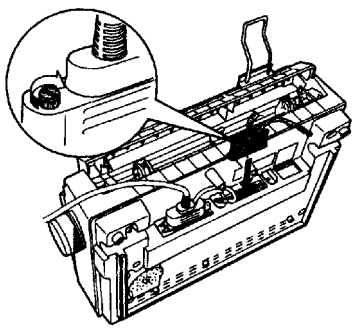
A Disconnect the mains lead and remove the printer cover.

B Move the print head to the middle of the printer.

C Grasp one side of the cassette and lift it upwards; the cassette can now be removed from the printer.

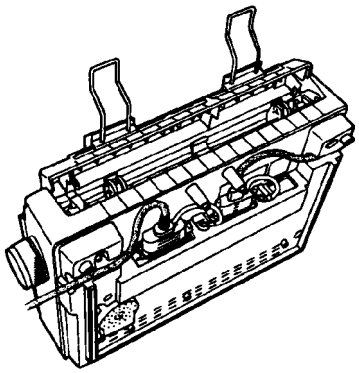
Connecting the printer to the control system

Serial connection



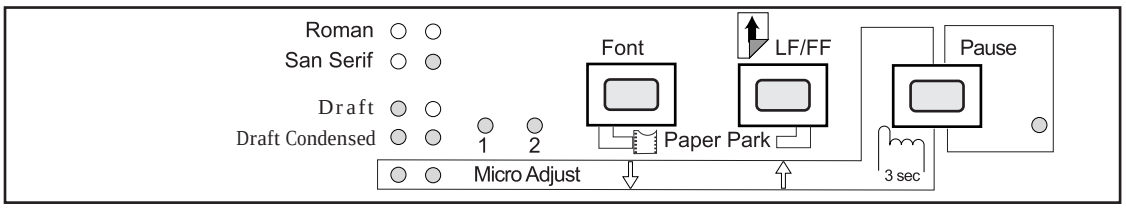
The cable from the printer port of the control system, marked J10 (Printer), must be connected to the right-hand connector as shown above. Plug in the connector and secure it with the screws.

Routing the cables
To prevent problems with the paper feed, pull the printer cable and the mains cable through the cable ducts of the printer.



Using the control panel

The buttons on the control panel can be used for certain printer functions such as line feed, page feed, paper load and feed and font selection. The lamps on the control panel show printer status and chosen font.



Lamps and buttons

PAUSE button and lamp

- The orange PAUSE lamp lights up when the printer stops printing.
- Every time the printer is switched on, the lamp flashes and the buzzer sounds four times.
- When the paper runs out, the lamp flashes four times and the buzzer sounds three times. Insert new paper and press the PAUSE button. The paper is drawn in and the printer can continue to print.
- In the event of a fault or error, the PAUSE lamp lights up and the buzzer sounds five times.

When the printer is ready to receive information from the control system, the PAUSE lamp must be unlit.
When the PAUSE button is pressed, the lamp lights up and printing stops. Press the button again to resume printing; the lamp goes out.

LF/FF button
Pressing this button briefly advances the paper one line for each press of the button. Hold down the button to advance the paper a full page.

FONT button
Use the FONT button to choose which font to use. The green lamps marked 1 and 2 indicate the chosen font as follows:

Font	Lamp 1	Lamp 2
Epson Roman (NLQ)	lit	lit
Epson Sans Serif (NLQ)	lit	unlit
Epson Draft	unlit	lit
Epson Draft condensed	unlit	unlit

The printer must be set to Epson Draft for correct printing from the control system.

If the FONT button is held down when the printer is switched on, printer setup menus appear. For further details see page 577.

Using different types of paper

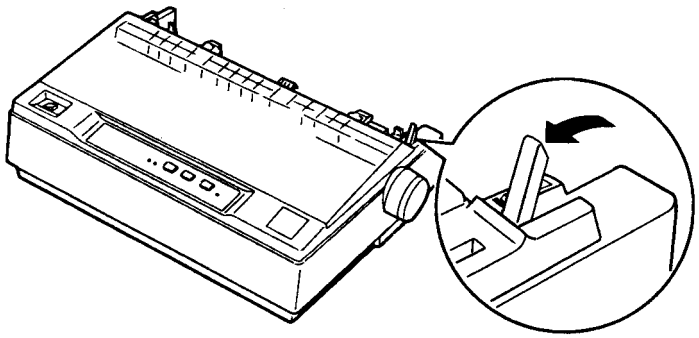
Printing with cut-sheet paper

NOTE: Not used for normal process logging
Load cut sheets as follows:

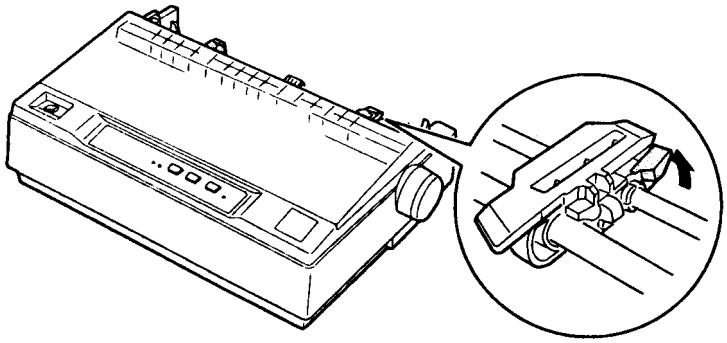
- Lower the paper selection lever.
- Raise the paper guide and insert the sheet of paper.
  The printer automatically loads the paper to the first printing line.

Printing with continuous stationery
This is how to load continuous stationery:

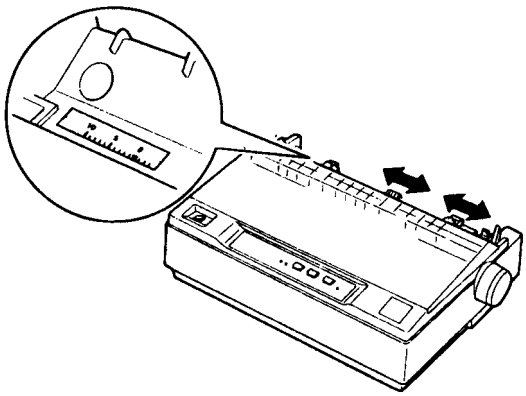
- Remove the paper guide and raise the paper selection lever.



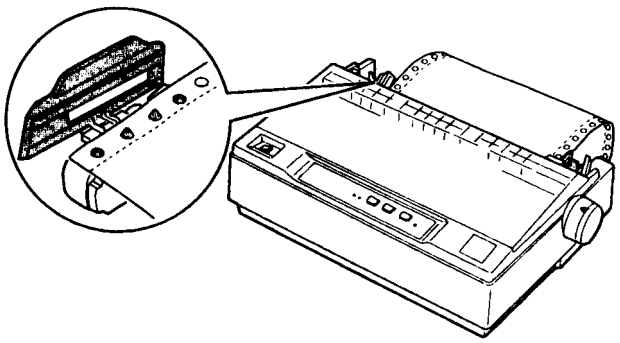
- Release the tractor feed locks by pulling the lock arms forward.



- Move the left-hand feeder unit to the left. Use the scale on the printer to determine the position. The first character will be printed immediately to the right of the zero point of the scale.



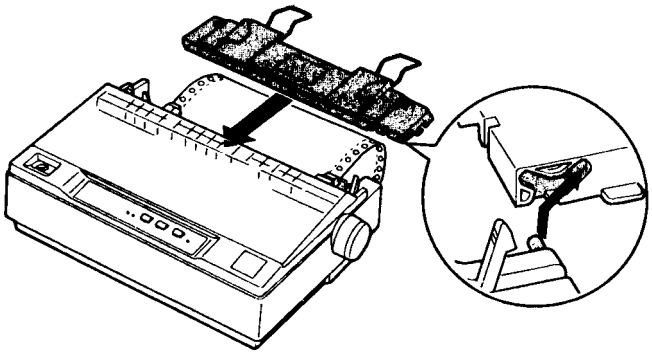
- Move the right-hand feeder unit to match the width of the paper, but do not lock it.
- Move the paper support of the tractor feed to midway between the feeder units.
- Open the covers on the feeder units and locate the first holes on the paper over the feed pins. Close the covers.



The leading edge of the paper must be straight and even.

- Move the right-hand tractor feed to tension the paper, and lock it. The paper is now parked and the printer will advance it automatically on printing.

- Put back the paper guide to separate the incoming and outgoing paper.



  - Hold the paper guide horizontal and fit the recesses over the pins on the printer.
  - Press the paper guide towards the front of the printer until it “snaps” into the correct position.

Setting the first printing line

This is the procedure for setting the first printing line:

A Load paper by pressing the LF/FF button.

B Hold down the PAUSE button until the printer “beeps” once (about 3 seconds) and lamps 1 and 2 start to flash.

C Adjust the position of the paper forward by pressing LF/FF or back by pressing the FONT button.

D Press PAUSE to end the procedure.

Using the self-test function of the printer

The built-in self-test function is used to check that the printer is working properly. This is how to start the self-test function.

- Use the LF/FF button to advance a new page to the printing position.
- Switch off the printer.
- Hold down the LF/FF button and switch on the printer; the self-test document starts printing.
- To suspend printing, press the PAUSE button.
- To terminate the self-test program press the LF/FF button.

Changing the settings

As delivered, the printer is correctly set up for the printouts that come from the control system. Normally there is no reason to change these values. In certain cases, e.g. when the printer is changed or when the printout files sent from the control system are altered, it may be necessary to change the settings.

The description below describes the setting procedure and states the factory settings of the printer.

Make sure that there is enough paper in the magazine. The printer will print several pages of help text.

1. Switch off the printer and check that the paper is correctly loaded.
2. Hold down the FONT button and switch on the printer. The printer prints the table below.

Lamp 1	Lamp 2	Language
Unlit	Lit	English
Unlit	Flashing	French
Lit	Unlit	German
Lit	Lit	Italian
Lit	Flashing	Spanish

3. Choose the language for the help texts to be printed, by pressing FONT until Lamps 1 and 2 indicate the required language.
4. Press LF/FF to confirm the choice. The printer prints a table of the current settings. Table A below shows the factory settings.

Current settings	
Character spacing	10 cpi
Shape of zero	0
Skip-over-perforation	Off
Character table	PC 437
Auto line feed	Off
Page length	12 inches
Auto tear off	Off
Tractor	Single
Interface	Serial
Bit rate	9600 bps
Parity	None
Data length	8 bit
EXT / ACK	Off

5. Press FONT to print out the help text (Table B) which shows how to choose the section to be changed. Note that, from now on, the behaviour of Lamps 1 and 2 and the lamp in the PAUSE button is what matters. Use FONT to change the configuration of the lamps. Press PAUSE to choose.
6. The printer always returns to Table B after every confirmed choice.
7. When the required changes have been made, switch off the printer. The settings remain in force until changed.

VAX061 . . . . . Circulation pump

Circulation pump

Service

Switch off mains at the safety switch and lock.

Information about the circulation pump is found in a separate manual. Pump designation is stated on the mark plate of the pump.

State the part number of the pump when contacting GETINGE AB. The number is found in the parts list of the tubing diagram.

Feed water pumps

Iron body

Item number	V	Hz	A	rpm
479 79 85 - 01	220 / 380	50	2,5 / 1,45	2900
479 79 85 - 02	255 / 440	50	1,9 / 1,1	2900
479 79 85 - 70	220 / 380	60	2,6 / 1,5	3450
479 79 85 - 71	240 / 415	50	2,2 / 1,25	2900
479 79 85 - 72	255 / 440	60	2,3 / 1,3	3450

Capacity: 2 - 14 l/m (pressure dependent)
Pressure: 8 - 2,7 bar(e) (capacity dependent)

Brass body

Item number	V	Hz	A	r/min.
560 35 87 - 01	220 / 380	50	2,1 / 1,2	2800

Capacity: 2 - 18 l/m (pressure dependent)
Pressure: 8 - 0,8 bar(e) (capacity dependent)

VAX118 . . . . . Feed water pump, 570 08 63 Electrical data

Feed water pump 570 08 63

Acidproof stainless steel body

Item number	V	Hz	A	r/min.
570 08 63-01	346 – 420 / 200 – 240	50	1,4 / 2,45	2820
	346 – 480 / 200 – 277	60	1,4 / 2,45	3400
570 08 63-03	200 – 240	50 / 60	3,0	2820 / 3400
570 08 63-04	100 – 115	50 / 60	4,4 / 6,0	2820 / 3400

Capacity: 1 – 17 l/m (pressure dependent)
Pressure: 4,5 – 0,5 bar(e) (capacity dependent)

VAX117 . . . . . Feed-water pump 570 08 63

Feed-water pumps

Pump casing in acid-resistant steel

Article number	V	Hz	A	rpm.
570 08 63 - 01	200 - 240 /	50	2.45	2820
	346 - 420		1.4	
	200 - 277 /	60	2.45	3400
	346 - 480		1.4	

Capacity: 2 – 16 l/min (pressure-dependent)
Pressure: 4,2 – 0,6 bar(e) (capacity-dependent)

Vacuum pump 479 01 68

Varieties

Item No.	V	Hz	kW
479 01 68-01	200-245/350-440	50	0,75
479 01 68-02	200-245/350-440	60	1,1

The direct on line starter cut out current, should be set to the value given by the motor data plate.
Seal water flow rate: 1 liter / 15 seconds.

VAX073 . . . . . Vacuum pump 570 04 17. Introduction

Vacuum pump 570 04 17

Varieties

Item No.	V	Hz	kW
570 04 17-01	220-240/380-415	50	1,5
570 04 17-02	220-240/380-400	60	2,6

The direct on line starter cut out current, should be set to the value given by the motor data plate.

Sealing water flow: 1 litre / 12 sec.

VAX074 . . . . . Vacuum pump 570 04 18. Introduction

Vacuum pump 570 04 18

Varieties

Item No.	V	Hz	kW
570 04 18-01	220-240/380-415	50	2,2
570 04 18-02	220-240/380-400	60	3,6

The direct on line starter cut out current, should be set to the value given by the motor data plate.

Sealing water flow: 1 litre / 6 sec.

VAX095 . . . . . Vacuum pump 479 04 20. Introduction

Vacuum pump 479 04 20

Varieties

Item No.	V	Hz	kW
479 04 20-01	200-254/350-440	50	1,5
479 04 20-02	200-254/350-440	60	2,2

The direct on line starter cut out current, should be set to the value given by the motor data plate.

Sealing water flow: 1 litre / 12 sec.

VAX096 . . . . . Vacuum pump 479 23 80. Introduction

Vacuum pump 479 23 80

Varieties

Item No.	V	Hz	kW
479 23 80-01	200-254/350-440	50	2,2
479 23 80-02	200-254/350-440	60	3,6

The direct on line starter cut out current, should be set to the value given by the motor data plate.

Sealing water flow: 1 litre / 6 sec.

VAX097 . . . . . Vacuum pump 479 23 79. Introduction

Vacuum pump 479 23 79

Varieties

Item No.	V	Hz	kW
479 23 79-01	200-254/346-440	50	3,0
479 23 79-02	200-277/346-480	60	3,6

The direct on line starter cut out current, should be set to the value given by the motor data plate.

VAX098 . . . . . Vacuum pump 479 23 78. Introduction

Vacuum pump 479 23 78

Varieties

Item No.	V	Hz	kW
479 23 78-01	400 IEC 38	50	4,0
479 23 78-02	380 — 440	60	6,0
479 23 78-26	200 — 254	50	4,0
479 23 78-27	200 — 254	60	6,2

The direct on line starter cut out current, should be set to the value given by the motor data plate.

VAX099 . . . . . Vacuum pump 480 01 73. Introduction LEM 250

Vacuum pump 480 01 73

Varieties

V	Hz	kW
400 IEC 38	50	5,5
380 — 440	60	8,0
200 — 240	50	5,5
200 — 240	60	9,0

The direct on line starter cut out current, should be set to the value given by the motor data plate.

Vakuum pump 480 01 73

Variants

V	Hz	kW
400 IEC 38	50	5.5
380 — 440	60	8.0
200 — 254	50	5.5
200 — 254	60	9.0

The contactor motor protection must be set to the rated current indicated on the motor data plate.

Sealing water: 1 litre / 15 seconds.

VAX056 . . . . . Vacuumpump tripping current

The tripping current of the direct-on-line starter should be set to the value given by the motor data plate.

VAX041 . . . . . Sealing water, vacuumpump.

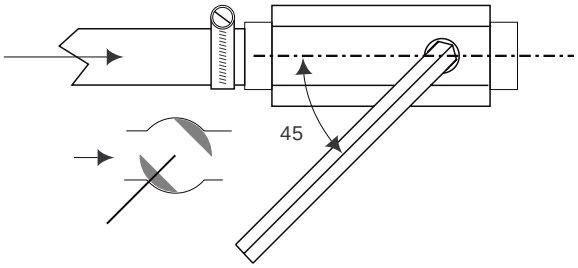
Sealing water

See also chapter Installation, section Water in the USERS MANUAL.

ADJUSTMENT OF SEALING WATER FLOW

1. Utilize the post treatment for the adjustment as this stage provides maximum time.
2. Remove the lid of the feed water tank.
3. Shut the ball valve between tank and pump and let the tank fill to the brim outlet. The tank content will then be about 3 litres.

4. Open the ball valve just less than 45° and keep the float valve closed by lifting the float.



5. Measure the time required for the pump to empty the tank. Adjust the valve opening until the time is 72 seconds.

CAUTION! The time that a pump is allowed to run without sealing water is strictly limited. The shaft seals of a dry running pump will very soon get leak-causing damage.

VAX075 . . . . . Sealing water without ECO system

Sealing water

See also the “Sealing water for the vacuum pump” section in the INSTALLATION INSTRUCTIONS chapter in the INSTRUCTION MANUAL.

Sealing water flow control
Perform the following adjustments during the post-treatment phase, when the vacuum pump is operating under stable pressure conditions.

1. Remove the cover from the feed water tank, and use it for the following measurements, knowing that the distance between the holes is equivalent to a tank volume of 0.5 l.
2. Open the ball valve by somewhat less than 45°.

Do not let the pump run with the ball valve closed. After a few minutes, this would completely empty the pump of water, damaging the shaft seals.

3. Place the lid in the feed water tank and fill the tank to the upper hole by pressing down the float valve.
4. Carefully hold the float valve closed and use a stop watch to measure the time taken for the level to fall by one litre.
   NB: The level must drop in the whole tank. If the tank is divided by a plate, it may be necessary to lift it in order to ensure this.

Adjust the ball valve setting so that the time taken is as shown in the specification under the “Vacuum pump” heading.

VAX093 . . . . . Sealing water without ECO system. PhDiv

Sealing water

See also the “Sealing water for the vacuum pump” section in the INSTALLATION INSTRUCTIONS chapter in the INSTRUCTION MANUAL.

Sealing water flow control
Perform the following adjustments during the post-treatment phase, when the vacuum pump is operating under stable pressure conditions.

1. Remove the cover from the feed water tank.
2. Open the ball valve by somewhat less than 45°.

Do not let the pump run with the ball valve closed. After a few minutes, this would completely empty the pump of water, damaging the shaft seals.

3. Fill the tank to the overflow level by holding down the float valve.
4. Carefully holding the float closed, use a stopwatch to measure the time taken for the water level to fall by an amount equivalent to one litre (i.e. a reduction in the water level from 110 mm to 70 mm)..

Adjust the ball valve setting so that the time taken is as shown in the specification under the “Vacuum pump” heading.

VAX100 . . . . . Sealing water PhDiv

Sealing water

See also the “Sealing water for the vacuum pump” section in the INSTALLATION INSTRUCTIONS chapter in the INSTRUCTION MANUAL.

Sealing water flow control
Perform the following adjustments during the post-treatment phase, when the vacuum pump is operating under stable pressure conditions.

1. Open the ball valve by somewhat less than 45°.

Do not let the pump run with the ball valve closed. After a few minutes, this would completely empty the pump of water, damaging the shaft seals.

2. Reduce the water flow rate as much as possible, but not to the extent that the pump starts to run unevenly, and then open the valve slightly to ensure sufficient water flow.

VAX042 . . . . . Anti cavitation air 1

Anti cavitation air

To counteract cavitation in the pump, small amounts of air are supplied from the feed water tank to the pump housing, via a fixed throttle.

VAM002 . . . . . Cavitation protection 1 GEF-449

Cavitation protection

To counteract cavitation in the pump, small quantities of air are supplied from the silencer, via a fixed constrictor to the pump casing.

VAX120 . . . . . Cavitation protection pjmps >LEM 90

Cavitation protection and vacuum depth

In order to counteract cavitation in the pump and ensure that a sufficient vacuum depth is attained, small quantities of air are supplied to the pump casing from three different points via adjustable restrictor valves.

- From the silencer.
- From a solenoid valve via the heat exchanger.
- From the feed-water tank.

The basic setting of the restrictors is 3 turns opening for the first two and 5 turns opening for the last one.

VAX043 . . . . . Anti cavitation air 2

In addition, air is supplied to the pump inlet via a solenoid valve mounted on the feed water tank.

VAX076 . . . . . Anti-cavitation air 3

Air is supplied via an adjustable throttle valve to the pump.

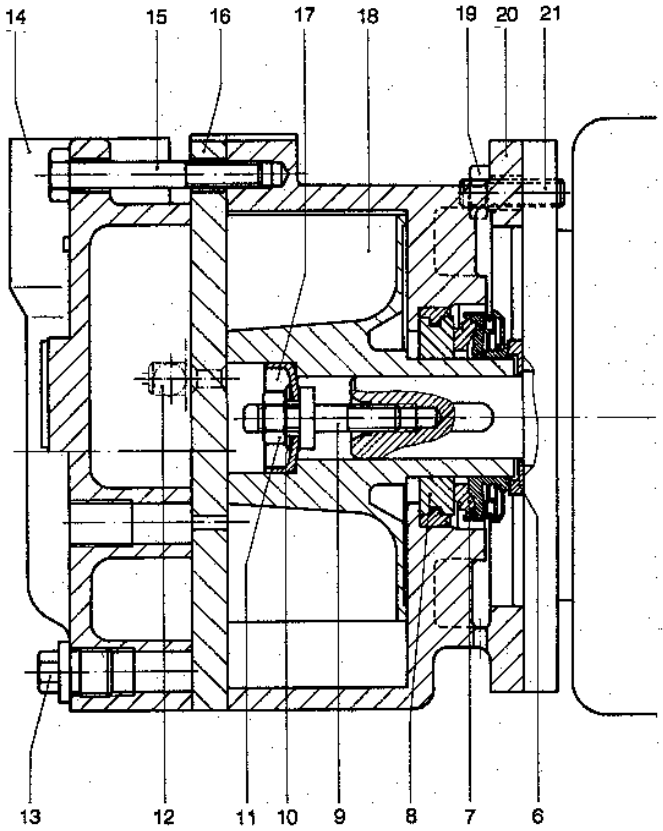
VAX077 . . . . . Anti-cavitation air 4

The third protection against cavitation supplies compressed air to the pump's suction line via a solenoid valve and a further adjustable throttle valve.

Open both the adjustable throttle valves through three turns (basic setting). This setting should be altered only under special conditions.

Servicing

Following advice is applicable to all kind of works inside the pump such as cleaning, replacing parts etc.



6	Spacer	14	Connection end plate
7	Shaft seal movable part	15	Screw
8	Sliding ring	16	Guide plate
9	Adjustment screw	17	Attachment washer
10	Washer	18	Impeller
11	Check nut	19	Nut
12	Plastic globe	20	Pump housing
13	Plug	21	Stud

Preparation

Switch off and lock the sterilizer safety switch prior to working on the sterilizer.

1. Remove all pipes connected to the pump.
2. Mark and remove the motor leads.
3. Loose the pump stand bolts and remove the pump.

Dismantling

1. Stand the pump on the motor fan cage with the shaft in vertical position and remove the connection plate attachment screws (15).
2. Separate the connection plate (14) together with the guide plate (16) from the pump housing (20) by prizing in the centre-groove with for instance a screw driver. *Take care of the plastic globes (12).*
3. Unscrew the counter nut (11).
4. Pull off the impeller (18) using either method a or b below, or a combination of these.
   a. Unscrew the adjustment screw (9) completely out of the shaft.
   b. Remove the motor flange attachment screws (19). With symmetrically applied levers, prize off the pump housing (20) so that the latter serves as a puller for the impeller. Use a puller if needed.
5. Do not use a hammer but press away smoothly the shaft seal sliding ring (8) in case it has to be replaced.

Reassembling

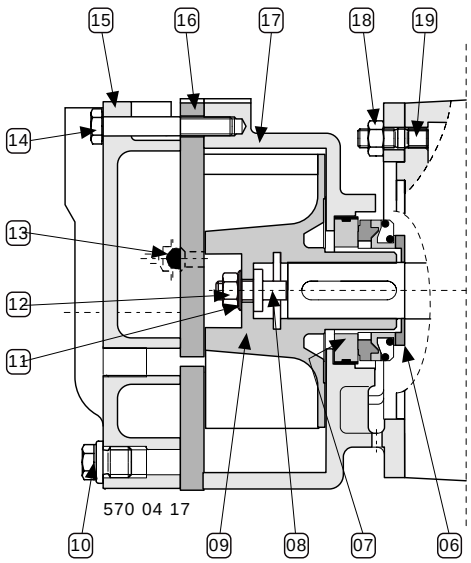
Prior to reassembling, all parts should be thoroughly cleaned and inspected. Special attention should be paid to sealing-surfaces with regard to wear and scratches.

1. Place the pump on the fan cage as when dismantling. If removed from the impeller, fit the screw (9) into the shaft thread.
2. Place the movable part of the shaft seal (7) concentrically around the shaft with the carbon seal ring facing upwards.
3. If the fixed stainless steel sliding ring (8) was removed, apply a thin grease coating on its rubber seal, turn it with the sliding surface towards yourself and push it into the pump housing (20) by hand.
4. Fit the pump housing (20). Turn it until its centre is at minimum distance to the pump stand and tighten the screws.

5. Screw home the adjusting screw (9) completely into the shaft and fit the impeller (18) with washer (10) and nut (11) so as to form a clearance space of 0.10 - 0.12 mm between the impeller and the guide plate (16). Lock the screw with the nut (11) without displacing the axial position of the impeller.
6. Apply a high viscous, semi-drying sealing compound such as Epple 33, Permatex or similar on the sealing surfaces of the pump housing (20) and the connection end plate (14). Fit the guide plate (16) including the globes and the connection end plate and tighten the attachment screws (15).
7. Bring, at the fan end, the shaft to rotate and check it for a smooth noiseless running.

Servicing

The following instructions are intended to assist all work that requires the pump to be dismantled.



6	Spacer	13	Valve globe
7	Mechanical seal	14	Screw
8	Adjustment screw	15	Pump end cover
9	Impeller	16	Guide plate
10	Plug	17	Pump casing
11	Washer	18	Nut
12	Locknut	19	Stud

Preparation

Switch off and lock the sterilizer safety switch prior to working on the sterilizer.

1. Remove all pipes connected to the pump.
2. Mark and remove the motor leads.
3. Loose the pump stand bolts and remove the pump.

Dismantling

1. Stand the pump on the motor fan cage with the shaft in vertical position and remove the connection plate attachment screws (14).
2. Separate the connection plate (15) together with the guide plate (16) from the pump housing (17) by prizing in the centre-groove with for instance a screw driver. Take care of the plastic globes (13).
3. Unscrew the counter nut (12).
4. Pull off the impeller (9) using either method a or b below, or a combination of these.
   a. Unscrew the adjustment screw (8) completely out of the shaft.
   b. Remove the motor flange attachment screws (18). With symmetrically applied levers, prize off the pump housing (17) so that the latter serves as a puller for the impeller. Use a puller if needed.
5. Do not use a hammer but press away smoothly the shaft seal sliding ring (7) in case it has to be replaced.

Reassembling

Prior to reassembling, all parts should be thoroughly cleaned and inspected. Special attention should be paid to sealing-surfaces with regard to wear and scratches.

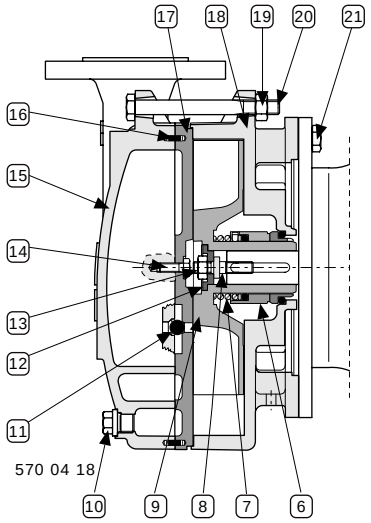
1. Place the pump on the fan cage as when dismantling.
2. Place the movable part of the shaft seal (7) concentrically around the shaft with the carbon seal ring facing upwards.
3. If the shaft seal (7) has been removed, apply soapy water to its rubber edge, turn it with the rubbing surface towards you and press it into position manually in the pump housing (17)
4. Fit the pump housing (17). Turn it until its centre is at minimum distance to the pump stand and tighten the screws.
5. Screw home the adjusting screw (8) completely into the shaft and fit the impeller (9) with washer (11) and nut (12) so as to form a clearance space of 0.10 - 0.12 mm between the impeller and the

guide plate (16). Lock the screw with the nut (12) without displacing the axial position of the impeller.

6. Apply a high viscous, semi-drying sealing compound such as Epple 33, Permatex or similar on the sealing surfaces of the pump housing (17) and the connection end plate (15). Fit the guide plate (16) including the valve globes (13) and the connection end plate and tighten the attachment screws (14).
7. Bring, at the fan end, the shaft to rotate and check it for a smooth noiseless running.

Servicing

The following instructions are intended to assist all work that requires the pump to be dismantled.



6.	Mechanical seal	14.	Screw
7.	Spacer sleeve	15.	Pump housing end plate
8.	Adjustment screw	16.	Stud
9.	Impeller	17.	Guide plate
10.	Plug	18.	Pump housing
11.	Valve globe	19.	Nut
12.	Cover	20.	Screw
13.	Nut	21.	Screw

Preparation

Switch off and lock the sterilizer safety switch prior to working on the sterilizer.

1. Remove all pipes connected to the pump.
2. Mark and remove the motor leads.
3. Loose the pump stand bolts and remove the pump.

Dismantling

1. Remove the five screws (20) from the pump housing end cover.
2. Separate the connection plate (15) together with the guide plate (17) from the pump housing (18) by prizing in the centre-groove with for instance a screw driver. Take care of the plastic globes (11).
3. Unscrew the counter nut (13).
4. Pull off the impeller (9) using either method a or b below, or a combination of these.
   a. Unscrew the adjustment screw (8) completely out of the shaft.
   b. Remove the motor flange attachment screws (21). With symmetrically applied levers, prize off the pump housing (18) so that the latter serves as a puller for the impeller. Use a puller if needed.
5. Remove the screw (14) and separate the guide plate (17) from the pump housing end cover (15).

Reassembling

Prior to reassembling, all parts should be thoroughly cleaned and inspected. Special attention should be paid to sealing-surfaces with regard to wear and scratches.

1. Place the pump on the fan cage as when dismantling. If removed from the impeller, fit the screw (8) into the shaft thread.
2. Press the fixed part of the shaft seal (06) into position in the pump housing (18).

Take care - the material of the ring is brittle and it is easy to damage the O-ring.

3. Position the pump housing (18) and turn it so that the off-centre displacement of the pump chamber relative to the motor shaft is at the

end nearest to the motor mount. Fasten it to the motor flange by means of screws (21).

4. Slide the rotating part of the shaft seal (06) over the impeller hub, turning the spring so that its bent ends engage in, and prevent rotation of, the sliding ring.
5. Secure the impeller (09) to the motor shaft using the adjustment screw (08) and nut (13). Make sure that there is a clearance of 0.15 - 0.2 mm between the impeller and the contact surface of the guide plate (17) on the pump housing (18).
6. Apply a high-viscosity, semi-drying sealing compound, such as Epple 33, Permatex or similar to the sealing surfaces of the pump housing end cover (15). Fit the guide plate (17) with its valve globes (11) to the end plate and fit and tighten the screws (14).
7. Apply the sealant to the rest of the sealing surfaces and fit the five screws (20), using them to fit the pump housing end cover (15) to the pump housing (18). Tighten alternate screws (i.e. nos. 1, 3, 5, 2, 4 etc.)

Turn the shaft from the fan end, and check that it rotates soundlessly.

VAX045 . . . . . Loosening a seized pump shaft

Loosening a seized pump shaft

It has been reported that the shaft of a vacuum- or feed water pump due to the fine clearances may become too tight after standing for a period without use. The motor will then not rotate when switched on. In this case, proceed as follows:

Switch off mains at the safety switch and lock.

- Remove the fan hood of the pump motor.
- Pry off the fan with two symmetrically applied levers (for example large screw drivers).
- Protect the shaft with a folded piece of sheet metal when applying a pipe wrench. Twist in both directions to loosen.
- If this procedure fails to loosen the shaft then:
- Loosen the screws, holding the pump housing together, about one turn.
- Make another attempt to loosen the shaft.
- If required, tap carefully on the loosened housing.
- Tighten the screws, in rotation checking that the shaft is free to rotate.

Reset the lockable switch and check by brief manual operation of the contactor that the pump works normally.

VAX057 . . . . . Vacuumpump See sep.manual
See also separate manual

VAX049 . . . . . Circular pen recorder

Circular recorder

Recorder chart replacement

- Open the lid of the recorder and pull out the pen lift.
- Remove the old chart carefully.
- Study the chart to check the pens for proper writing. Replace faulty pens.
- Date the new chart in the central blank space and place under the two plate tags and the time index. Turn it until the peripheral numbers 1-12 indicate correct time of the day against the time index.
  - Example: When placing the chart at 08.00 turn so that the index tip point is at number 8 on the chart.
- Lower the fixing yoke and guide it into the slot on the hub so that the paper is secured against the hub.
- Tilt back the pen lifter, check the contact of the pens with the paper, and close the cover.

Replacing of pen

The pens shall with care be mounted on the penlift. Always check before mounting that the slot, on the backside of the new pen, are open and without burrs. Rinse when necessary.

Adjustment of pressure and temperature recording

1. Fit an inspection pressure gauge to the pressure gauge cock.
2. Place the transmitter of a temperature checking instrument on or close to the recorder sensor bulb.
3. Adjust the pressure recording pen by means of its adjusting screw to indicating zero pressure on the chart.
4. In the same way adjust the other recorder pen to register the checking instrument temperature.

5. Start a process and let it stabilize in the sterilizing phase.
6. Compare the recorded pressure and temperature with those indicated by the checking instruments. If the deviation measured at the tip of the pen, is less than one millimetre, the pen arms should be adjusted so as to show correct temperature and pressure in the range where these values are most important.
7. If the deviation is more than 1 millimetre there must be some fault that should be remedied by an instrument engineer.

VAX050 . . . . . Recorder type Honeywell RL112

Recorder type Honeywell RL112

Technical data

- Dimensions (w x d x h): 144 x 144 x 270 mm
- Two pens for recording pressure and temperature
- Power: 24 V 50 Hz or 60 Hz (selectable)
- Paper speed: Selectable: 60, 120, 240, 480 mm/hr.
- Remote-controlled paper feed
- Two extra terminal blocks
- Power supply for external transducer: 10 V DC, 5 mA
- Rear connection protection with four Pg7 cable bushings
- Weight: 4 kg
- Plastic measuring rulers supplied
- Ambient temperature in service 0-60 °C (20 mm from unit).
- Writing width: 100 mm
- Accuracy, resolution and sampling rate to prEN 285.

Recording paper

- Fan-fold paper
- Paper graduations: 75 linear divisions, alternating scale divisions 0-150 °C, and -1 to +4 bar
- Time markings every 5 minutes (at 240 mm/h paper speed)

Measuring circuit 1

- Measuring range of pen 1: 0-100 mV lin.

- Colour, pen 1 and marker 1: RED
- Scale 1: -1 to +4 bar

Measuring circuit 2

- Measuring range of pen 2: 0-150 °C linear Pt 100 input.
- Colour, pen 2 and marker 2: GREEN
- Scale 2: 0 to 150 °C

See also separate manual.

Multi point recorder, Type Chessel 306

Technical data

Recording system	Dot prints with 6 colours. Replaceable ink cartridge with fibre tip pens.
Number of channels	6
Channel colours	Channel 1violet channel 2 red channel 3black channel 4green channel 5blue channel 6brown Print interval 0.5 mm along time scale
Range channel 1 - 5	50 - 150 ^{o}C RTD sensor type Pt100
Range channel 6	-10 to +400 kPa through pressure transducer 0 - 100 mV
Chart speed	5, 10, 20, 30, 60 and 120 mm/h
Chart	Roll containing a length of 32 meter
Recording width	100 mm
Calibration	50 -division
Ink content	enough for 500 000 dots per channel
Environmental requirements	0 - 50 ^{o}C, 10 - 90% Rh not condensating
Initial print out Line 1	ID No., paper speed, date, clock
Initial print out Line 2	Numbering the chart temperature divisions
Initial print out Line 3	Numbering the chart pressure divisions

Recording

Channel 1 (violet)	prints the chamber temperature, 50 - 150 ^{o}C.

Channel 2 (black)	prints the load temperature from load sensor 1, 50 - 150 ^{o}C.
Channel 3 (black)	prints the load temperature from load sensor 2, 50 -150 ^{o}C.
Channel 4 (green)	----------
Channel 5 (blue)	----------
Channel 6 (brown)	prints the pressure, -1 to +4 bar(e).

Initial setting of chart speed is 20 mm/hr.

The recorder is automatically started as the control unit is powered up.

Commissioning

Battery
The instrument is fitted with a battery to save certain information during power failure. When supplied, the battery is disconnected.

Before putting the instrument into operation reconnect the battery as follows:

- Open the instrument door.
- Remove the chart cassette by releasing its latch on the bottom right.
- Place the hand under the cassette, swing up through 90^{o} and pull forward to remove.
- Using a screw driver turn the unlocking screw in the centre of the control panel to release the instrument from the case.
- Carefully pull the instrument out of the case.
- Turn the instrument onto its back on a clean flat surface to gain access to the underside.
- Identify link LK 15 to the left of the battery plus (+) mark.
- Reconnect the battery by moving link LK 15 so as to make contact with both pins.

Note! When replacing the battery ensure correct polarity. Corrupt data in the battery supported memory causes a line to be drawn at the edge of the chart.

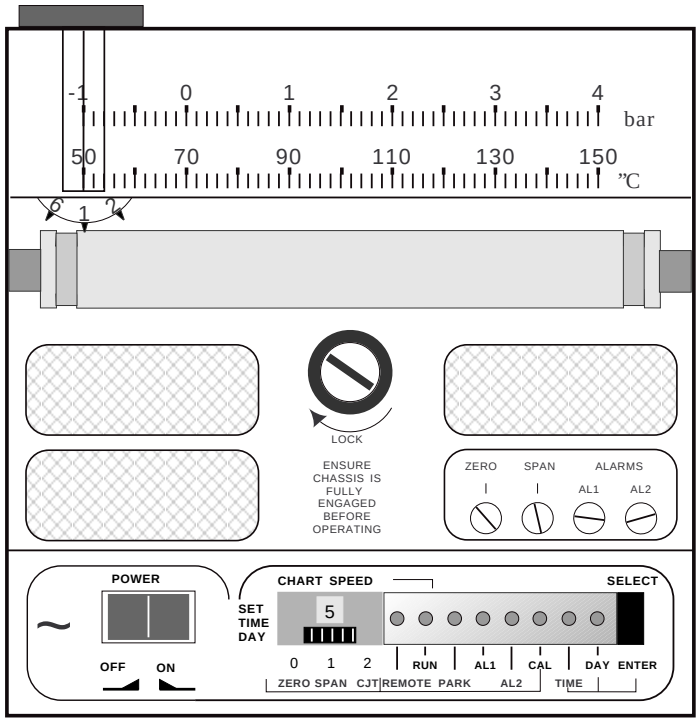
Setting ID number
The ID number, the first two characters of the status print out, is selected via the ID switches while the recorder is in the same position

as when reconnecting the battery. The lever to the right of the PRINT SKIP switches determine whether the ID-number digit switches select figures or letters as follows:

Lever switch		Digital switch		
ID	Position	ID	Position	Print out
MS	Up	SW6	2 - 7	A - F
MS	Down	SW6	0 - 9	0 - 9
LS	Up	SW5	2 - 7	A - F
LS	Down	SW5	0 - 9	0 - 9

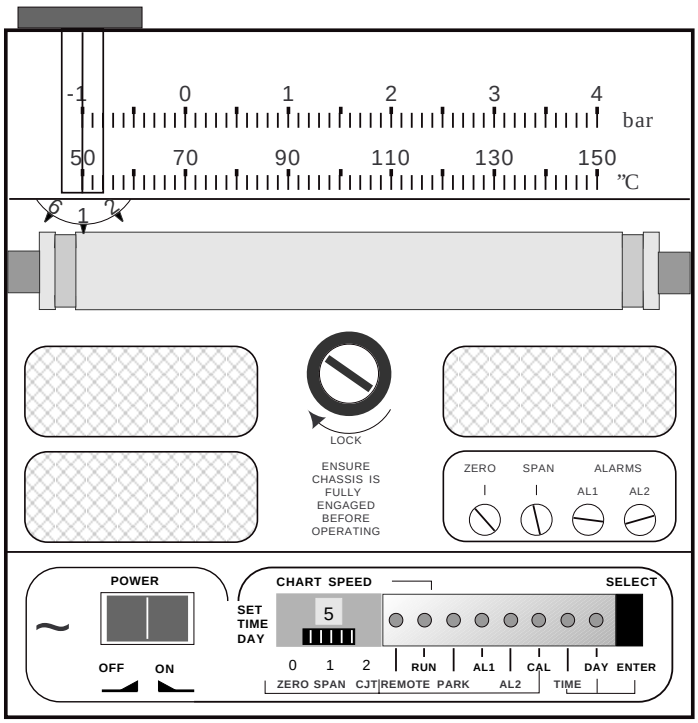
Fit the recorder back into the box.

Time setting



- Apply power to the instrument (usually done by power up the control unit) and allow it to enter the “RUN” mode.
- Remove the cassette, as described under 1 and 2 above and press the “ENTER” button until the “TIME” LED is illuminated.
- Rotate the thumbwheel switch to show the “TENS” of hours digit and momentarily press the “ENTER” button. All LEDs will flash once to acknowledge correct data entry.

The HOURS UNITS followed by the MINUTES TENS and then MINUTES UNITS are similarly entered to complete the time setting sequence.



All LED's will then flash for 15 seconds or until the “ENTER” button is again depressed to select the RUN mode.

Date setting
The DATE entry sequence is independent of the printout format.

- Apply power to the instrument (usually done by power up the control unit) and allow it to enter the RUN mode.
- Remove the cassette, as described under “BATTERY” above and press the “ENTER” button until the “DAY” led is illuminated.
- Rotate the thumbwheel switch to show the “TENS” of years digit and momentarily press the “ENTER” button. All LEDs will flash once to acknowledge correct data entry.

The YEARS UNITS, MONTHS TENS, MONTHS UNITS, DAY TENS then DAYS UNITS follow to complete the date setting sequence.

All LED's will then flash for 15 seconds or until the “ENTER” button is again depressed to select the RUN mode.

Time or date setting errors
An attempt to enter an illegal time or date digit will result in all lights flashing for 5 seconds and the 306 returning to the timer or date entry mode without accepting any of the entered digits.

Chart cassette removal

- Open the door and press the cassette release latch on the bottom right.
- Place the hand under the cassette, swing up through 90^{o} and pull forward to remove. Replacement is the reverse procedure.

Chart removal

- Remove the cassette from the instrument.
- Wind back some of the used part of the chart until it is slack enough to clear the sprockets.
- Pull each end of the chart off each spool a little at a time to avoid tearing. (there is a groove across the face of the chart cassette to aid tearing off sections of used chart). For recorders with plastic take-up spool: place a finger inside the chart roll and the thumb outside. Pull the roll off the take-up spool.

Chart loading

- Remove the cassette from the instrument.
- Place the cassette on a flat surface, face down.
- Push the new chart roll over the chart feed spool.
- Fit a cart tube over the take-up spool if no plastic take-up tube is fitted.
- Take the end of the chart and pull off about 30 cm (12 in) of paper. (Chart paper spare part No. 479 19 61-21)
- Pass the chart over the top of the cassette, across the front and fix it to the card tube of the take-up spool with adhesive tape, or tear the paper diagonally and slot into the plastic take-up tube.
- Check that the paper is correctly located on the upper and lower sprockets.
- Replace the cassette in the instrument and take up any slack in the paper with the drive gear.

Control panel access

The operator controls are situated on the control panel bulkhead behind the chart cassette. To gain access to these controls it is necessary to remove the chart cassette.

Pen cartridge replacement

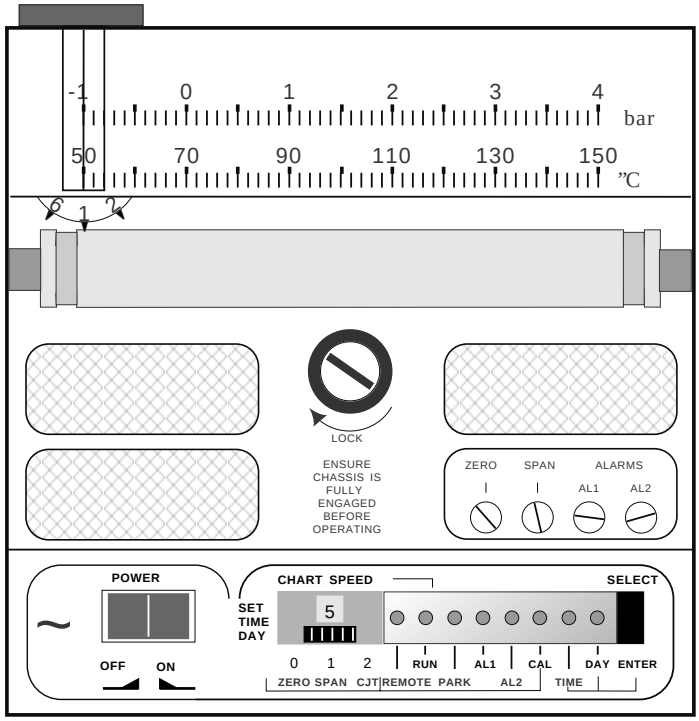
- The six colour disposable pen cartridge is a snap-fit to the print head.
- Select the PEN mode.

This positions the head off the end stop and orientates the head so that the procedure for changing the cartridge is always the same.

- Pen cartridges are available from stock - part number 479 19 61-23.
- Remove spent cartridge by pulling it firmly forward.
- Remove the new pen from its container *but NOT its holder.*
- Align the new cartridge to the head key-way, rotating anti-clock-wise, and press into position using the holder.
- Remove the cartridge holder.

N.B. If the recorder is not to be used for an extended period, the pen cartridge should be removed and stored in its original packing. This is to reduce ink loss due to evap-oration.

Control panel switches and indicators



ON/OFF switch:
This switch is located on the left of the control panel. When the instrument is switched on it automatically follows an initialising routine which includes moving and rotating the print head and moving the chart forward. It then enters the normal RUN mode. Recordings are produced every 0.5 mm of chart. When the instrument is not printing the print head is stationary above the left-hand side of the chart.

Function indicators:
Eight LED's situated at the bottom right-hand side are used to indicate which mode the recorder is in. Their functions are as follows:

RUN	AL1	TIME	REMOTE
PEN	AL2	DAY	
	CAL		

SELECT/ENTER press switch:
When the SELECT/ENTER switch is held down, all measurements are suspended and the function indicators light up one at a time. When an indicator associated with a particular mode is illuminated, the switch should be released and that control function is then accessible. This switch is also used to enter data selected by the CHART SPEED/SET TIME DAY digit switch.

CHART SPEED / SET TIME DIGIT SWITCH
Used to:
select chart speed (when in the RUN mode)
set the day and time clock
select the channels to check signal level during calibration
set servo zero and span.

ZERO-SPAN potentiometers
Used to set the recorder servo system zero and span. This adjustment affects the pen position only. It enables any differences between the alignment of the pen and chart to be corrected, which may be necessary after a new chart has been fitted. Select the CAL mode as shown below and adjust zero and span if required. This adjustment can be set to suit scale OR paper. Press the SELECT/ENTER button to return to RUN mode, reset chart speed and replace cassette.

CAL. mode
The pen position servo zero and span, and signal levels of all six channels can also be checked using the CAL function.

Set the digit switch (CHART SPEED/SET TIME DAY) to 8 and select CAL mode. All the L.E.D.'s will flash until a number from the table below is selected on the digit switch:

Digit switch number	Pen and cursor move to:
0	Zero
1	Channel 1 signal level
2	Channel 2 signal level
3	Channel 3 signal level
4	Channel 4 signal level
5	Channel 5 signal level
6	Channel 6 signal level
7	100% span
8	Setting AL1
9	Setting AL2

Chart speed
To change the chart speed (the recorder has six chart speeds and OFF), select enter RUN if the instrument is not already in that mode, by using the SELECT/ENTER press switch.

Select the chart speed from the chart speed table above the control panel and enter via the CHART SPEED digit switch.

On Level 2 and 3 versions the alphanumeric printing is suppressed at the 120 mm/h speed.

Do not forget to reset the chart speed in all cases when returning to the RUN mode.

Line recorder 570 01 97

Technical data

Input types	Channel 1: Pt100 Channel 2: 0-100 mV Channel 3: Pt100*1
Scale	Channel 1: 0-150 °C Channel 2: -1 to +4 bar Channel 3: 0-150 °C*1
Measurement accuracy	±1%
Zero adjustment	0-50% of scale length
Limit frequency for input signal	0.5 Hz
Response time (damping)	Adjustable between 0.5 and 10 seconds
Paper feed	Crystal-controlled stepping motor
Time accuracy class	Better than 0.5%
Recording method	Ink on graph paper
Pen type	Fibre-tip pen (refillable disposable type)
Pen colour	Channel 1: green Channel 2: red Channel 3: blue
Paper width	100 mm
Paper type	Fanfold: Length 8 metres with time markings and scales for temperature and pressure
Paper speed	Preset to 240 mm/h Adjustable 20-40-120-240-600-1200 mm/h 1500 mm/h mains-frequency-controlled
Remote control	Closing, speed 1 On opening, approx. 10 cm at speed 2, then stop
Supply voltage	24 V 50 Hz (60 Hz selectable) ±10%

Insulation voltage	Between mains unit and measurement cards: 3 kV 50 Hz Between measurement cards: 500 V 50 Hz
Ambient temperature	0-60 ^{o}C
Relative air humidity	max. 80%

*1. Only occurs in certain cases

Installation

Transport locks

- Remove the folded piece of metal clamped pull-out latch at the top right corner.
- Release the latch by pressing it to the right and pull the printer out a short distance
- Remove the transport blocks that keep the pen holders in position
- Push the printer back in and check that the latch engages so that the printer is securely fixed in the box.

Voltage and frequency
The printer is supplied for 24 V 50 Hz. To switch to 60 Hz, proceed as follows:

- Release the latch top right and pull the printer out as far as the stop.
- On the right-hand side of the printer there is a small green jumper between two dip-switches. The jumper is marked “50 Hz 60 Hz”.
- Pull out the jumper and put it back again on the pin in the middle and the pin on the right.
- Push the printer back in and check that the latch engages so that the printer is securely fixed in the box.

Operating instructions

Changing the paper

- Release the latch top right and pull the printer out as far as the stop.
- Pull the lower part of the paper tray upwards and outwards so that the lower pins leave the slots; pull out the paper tray
- Remove used paper in the front magazine.
- Lower the paper guide on the front of the tray and remove the cover on the rear paper magazine by pressing it upwards.
- Put in new graph paper, pull the paper up over the roller and put back the cover.

- Adjust the paper so that it is correctly positioned over the tractor feeders and fold up the paper guide
- Push the printer back in and check that the latch engages so that the printer is securely fixed in the box.

Changing a pen

- Release the latch in the top right corner and pull the printer a short distance out of the box.
- Raise the scale above the old pen and pull the pen straight out.
- Insert a new pen, making sure that it is fully home in the pen holder.
- Push the printer back in and check that the latch engages so that the printer is securely fixed in the box.

The pens are disposable fibre-tip pens, but can be re-filled with fresh ink if required. Ready-filled pens and pen servicing kits containing ink, tips and filler gun for two or three channels are available as spare parts.

Adjustment and calibration

Paper speed

- Release the latch top right and pull the printer out as far as the stop.
- On the right-hand side of the printer there are two dip-switches and a table of settings.
- Set paper speeds 1 and 2 by setting the dip-switches as shown in the table.
- Push the printer back in and check that the latch engages so that the printer is securely fixed in the box.

Signal damping
If the input signal is uneven, it may be necessary to damp it.

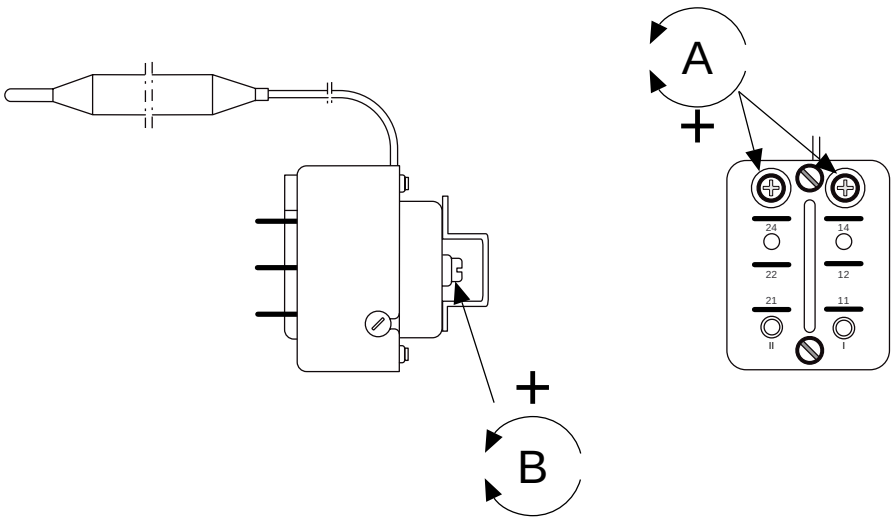
- Release the latch top right and pull the printer out as far as the stop.
- Check that there is an input signal to the printer on the channel to be adjusted.
- Adjust the filter for that channel with the right-hand potentiometer marked “0.5-10 s”
- Push the printer back in and check that the latch engages so that the printer is securely fixed in the box.

Adjusting zero point and span

- Leave the printer on for ten minutes
- Release the latch top right and pull the printer out as far as the stop.

- Connect the channel that is to be adjusted to an adjustable signal source of sufficiently high accuracy.
- Set the signal to the zero-point value of the channel and adjust the zero point with the potentiometer marked “0”.
- Set the signal to the maximum value of the channel and adjust the span with the potentiometer marked “Max.”.
- Repeat the procedure until both zero point and span are correct.
- Push the printer back in and check that the latch engages so that the printer is securely fixed in the box.

Thermostat 479 19 11



A Setting tripping temperature

B Simultaneous adjustment of all contact groups. Mutual temperature interval is maintained.

Technical data

- Max ambient temperature 80^{o}C
- Max sensor bulb temperature 150^{o}C
- Contact ratings:
  - 11 – 14 and 21 – 24: 16A/380V
  - 11 – 14 and 21 – 24: 6A/380V

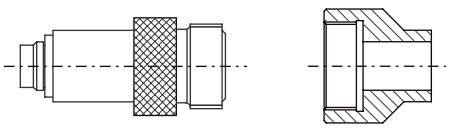
Type	Tripping temperature with increasing temp.	
	11 – 12 ➔ 11 – 14	21 – 22 ➔ 21 – 24
479 19 11-01	60±2°C	45±2°C
479 19 11-02	70±2°C	55±2°C

VAX039 . . . . . Pressure transducer.

Pressure transducer

The control system uses the pressure transducer to measure the pressure. The pressure transducer itself does not have any means of calibration; instead this is done with the control system. The system must be checked regularly as described under “Maintenance”.

Carefully remove the pressure transducer, using hand force. If necessary, a polygrip tool may be used, in which case the tool must be applied to the knurled part and used with great care.



Sealing against the inner part of the pressure transducer and outwards towards the service space is provided by a small O-ring located between the diaphragm of the pressure transducer and the adapter mounted on the sterilizer chamber. When fitting the pressure transducer, screw it fully home into the adapter by hand, then carefully secure it with the polygrip tool applied to the knurled part.

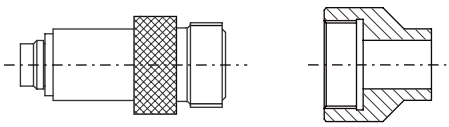
Hand tightening is normally sufficient to provide a seal. Take great care when using the polygrip tool, to avoid subjecting the pressure transducer to stresses that might lead to incorrect indications.

Take care not to damage the diaphragm when assembling and dismantling. Never use tape, sealing compound etc. to seal the thread.

Pressure transducer

The signal from the pressure transducer is used by the control unit and, where applicable, by the PACS Supervisor, to measure pressure. The pressure transducer itself does not have any means of calibration instead this is done with the control system or the supervisor. The transducer must be calibrated regularly, as described in the MAINTENANCE chapter.

Carefully remove the pressure transducer, using hand force. If necessary, a polygrip tool may be used, in which case the tool must be applied to the knurled part and used with great care.



Sealing against the inner part of the pressure transducer and outwards towards the service space is provided by a small O-ring located between the diaphragm of the pressure transducer and the adapter mounted on the sterilizer chamber. When fitting the pressure transducer, screw it fully home into the adapter by hand, then carefully secure it with the polygrip tool applied to the knurled part.

Hand tightening is normally sufficient to provide a seal. Take great care when using the polygrip tool, to avoid subjecting the pressure transducer to stresses that might lead to incorrect indications.

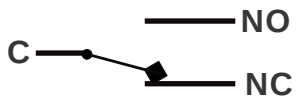
Take care not to damage the diaphragm when assembling and dismantling. Never use tape, sealing compound etc. to seal the thread.
Always fit a new O-ring when the transducer is refitted.

Two circuit pressure switch 469 51 73

1 bar = 100 kPa = 14.504 psig

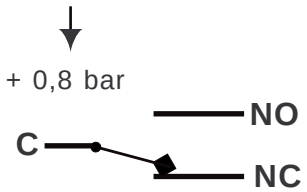
Item number	Range bar	Switching difference (fixed) bar	Permissible pressure bar
469 51 73-02	-1 till +1,0	0,1	4,0
469 51 73-03	+0,14 till +4,0	0,1	5,0

Temperature limits -20 - 70 °C
Contact ratings 5A / 250 V

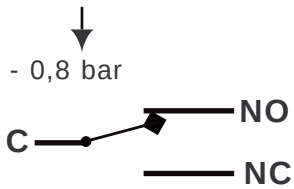


Contact situation at atmospheric pressure with the type 469 51 73-03.

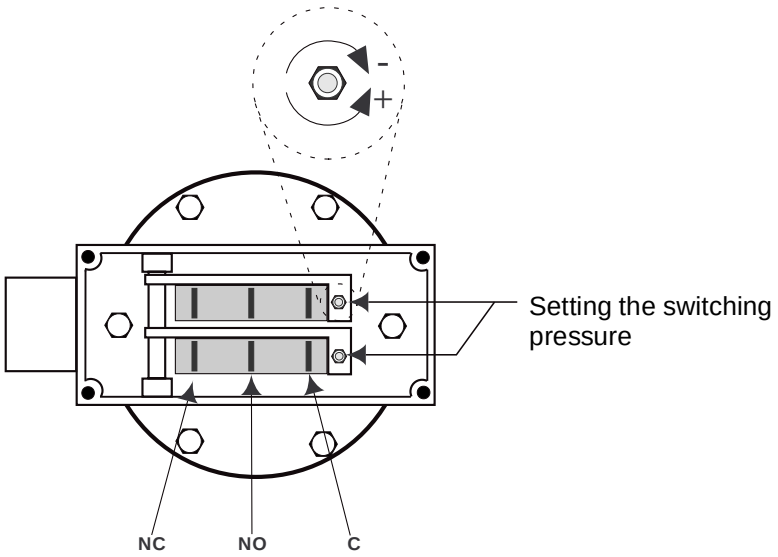
With type 02, the contact situation depends on whether the switch is set for change over at sub- or overatmospheric pressure. The figures below illustrate the contact position at atmospheric pressure.



Change over from C-NC to C-N takes place at +0.8 bar, falling pressure
.



Change over from C-NC to C-NO takes place at -0.8 bar, falling pressure



The markings NC, NO and C appear at the contacts of the pressure switch.

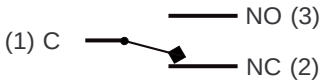
The adjusting screws are electrically live. To avoid short circuits, use insulated tools.

Single circuit pressure switch 469 56 96

1 bar = 100 kPa = 14.504 psig

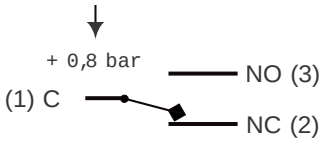
Item number	Range bar	Switching difference (fixed) bar	Switching difference adjustable bar	Permissible pressure bar
469 56 96-01	0,14 - +4		0,2 ±0,1	5,0
469 56 96-02	-1 - +1		0,15 ±0,05	4,0
469 56 96-03	0,5 - 11	0,3 ±0,1		13,75
469 56 96-08	0,5 - 11	0,3 ±0,1		13,75

Temperature limits -20 - +70 ^{o}C
Contact ratings 5A / 250 V

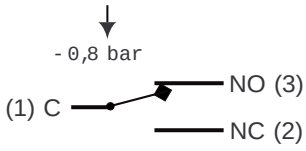


Contact situation at atmospheric pressure with the type 469 56 96

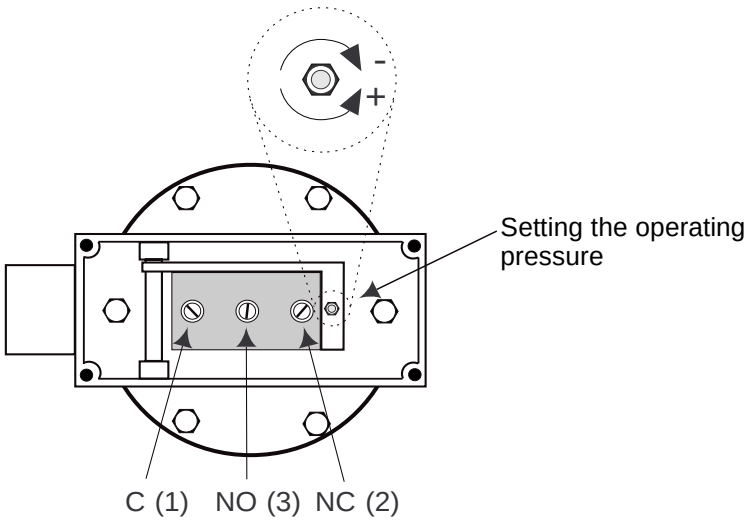
With type 02, the contact situation depends on whether the switch is set for change over at sub- or overatmospheric pressure. The figures below illustrate the contact position at atmospheric pressure.



Change over from C-NC to C-N takes place at +0.8 bar, falling pressure.



Change over from C-NC to C-NO takes place at -0.8 bar, falling pressure.



The markings NC, NO and C (or 1, 3, 2) appear at the contacts of the pressure switch.

The adjusting screws are electrically live. To avoid short circuits, use insulated tools.

Pressure switch 570 02 36

1 bar = 100 kPa = 14.504 psig

The pressure switch is factory set and is not intended to be adjusted. The switch is replaced should the switching pressure be out of range.
All parts of the switch coming in contact with media are made of acid-proof stainless steel W nr 1.4401 (316)

Item number	Switching limit at: increasing pressure bar(e)	Switching limit at: decreasing pressure bar(e)	Tolerances at increasing or decreasing press. bar	Locking paint colour
570 02 36-01	2,0	1,7	± 0,15	Red
570 02 36-03	0,15	0,10	± 0,013	Black
570 02 36-04	3,5	3,0	± 0,35	Blue
570 02 36-05	-0,3	-0,2	± 0,025	Yellow

Temperature limits -20 - +135 ^{o}C
Contact ratings 6A / 250 V

Contact situation at atmospheric pressure with the types
570 02 36- 01, -03, -0

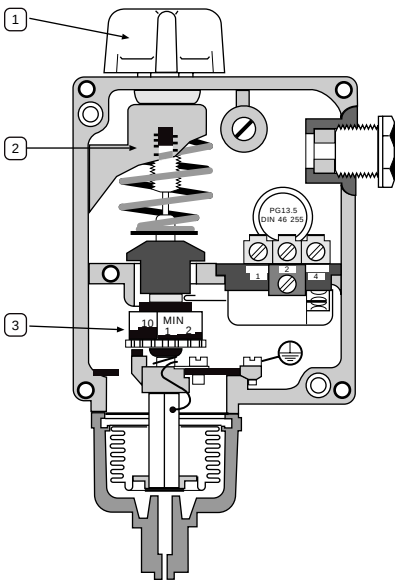
Contact situation at atmospheric pressure with the typ
570 02 36- 05

Pressure switch 479 5717

1 bar =100 kPa =14.504 psig

Part No.	Range bar	Switching diff. bar	Max pressure. bar
479 57 17-01	-1 - 0	0,09 - 0,4	7
479 57 17-02	±0 - 0,3	0,01 - 0,05	0,5
479 57 17-03	4 - 17	1,2 - 4,0	28
479 57 17-04	0,2 - 6	0,25 -1,20	25
479 57 17-05	0,1 - 1,1	0,07 - 0,16	7
479 57 17-06	0,2 - 3,0	0,08 - 0,25	7
479 57 17-07	1 - 10	0,3 - 1,3	25
479 57 17-08	10 - 30	1,0 - 4,0	45
479 57 17-09	1 - 10	0,4 (fixed)	14

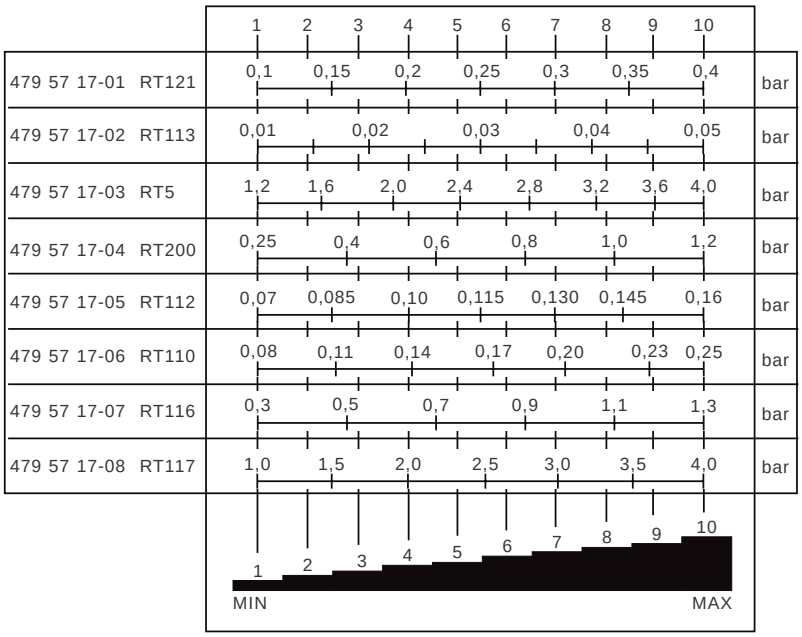
Setting



The pressure controller is set by rotating the knob (1), at the same time reading the main scale (2). Set the function that is actual at decreasing pressure.

The differential is set by rotating the differential adjusting nut (3) to the value indicated by the use of the nomogram below. The maximum

operating pressure is thus the sum of the setting pressure and the differential.



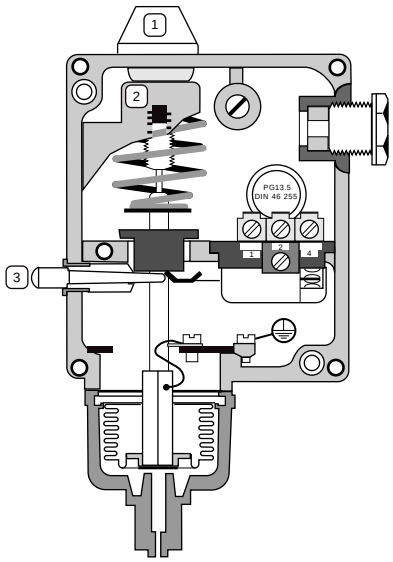
VAX081 . . . . . . Safety pressure switch, Danfoss

Safety pressure switch, 479 5717

1bar =100 kPa =14.504 psig

Part No.	Range bar	Switching diff. bar	Max pressure. bar
479 57 17-09	1 - 10	0,4 (fix)	14

Adjustment



Set the pressure switch to open as the pressure rises. Do this by first removing the upper screw together with the conical adjusting cover. This will reveal the adjustment screw (1) which should be turned with a spanner while reading the scale (2).

After it has operated, the pressure switch cannot be reset by the reset push-button (3) until the pressure has dropped below the set pressure minus the fixed changeover differential pressure.

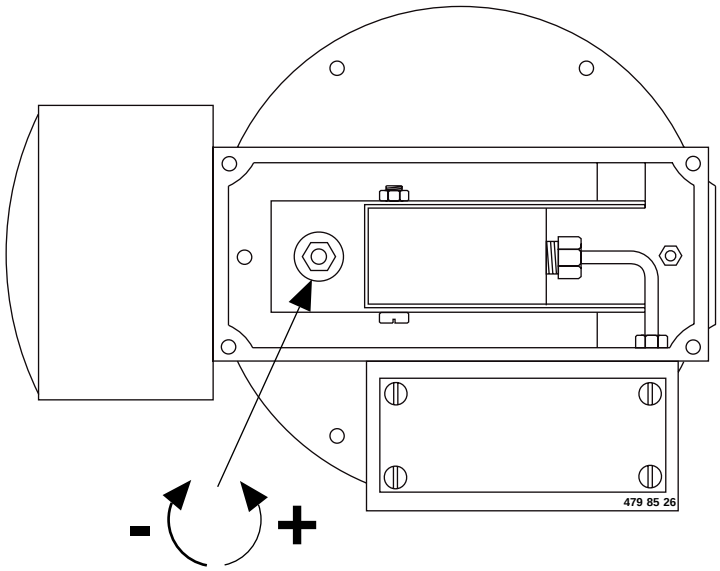
VAX090 . . . . . Single circuit pressure switch 479 85 26

Pressure switch with pneumatic output 479 85 26I

Item No.	Range, bar	Switch operation pressure, bar	Max. pressure, bar
479 85 26-01	2.1 - 42	0.8	80
479 85 26-02	-1.0 - 1.0	0.04	40

479 85 26-01 generates an output signal when the pressure exceeds the set value.
479 85 26-02 generates an output signal when the pressure drops below the set value.

The signal system supply pressure must be 2-10 bar.



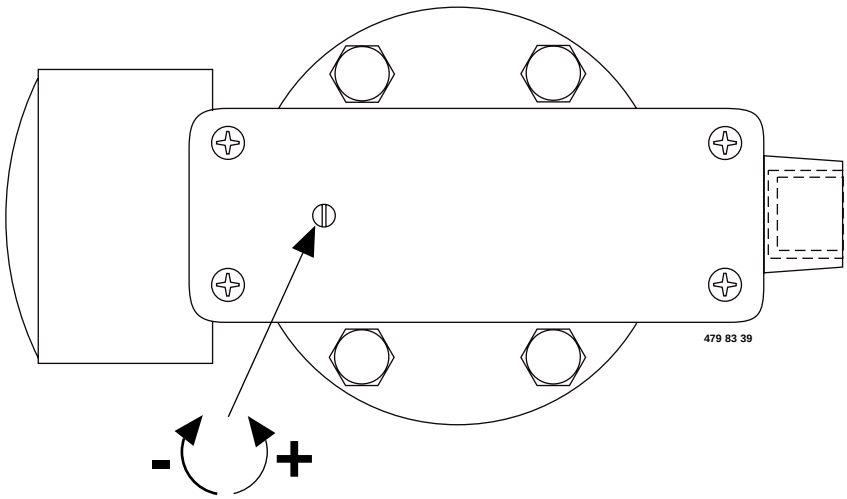
VAX091 . . . . . . Single circuit pressure switch 479 83 39

Pressure switch 479 83 39

Item No.	Range, bar	Switch operation pressure, bar	Max. pressure, bar
479 83 39-01	-1 – 3.0	0.07	40
479 83 39-02	2 – 42	0.067	80
479 83 39-03	0.15 – 4.00	0.07	40

All material in contact with the pressurised medium is of stainless steel.
Contact ty p e:Changeover
Breaking capacity:5A at 250 VAC

Maximum voltage:440 VAC
Temperature range: -1 to +60 °C



VAX038 . . . . . Solenoid valves.

Solenoid valves

Hum from a solenoid valve may be a forewarning of overheating due to abnormally high electric current through the solenoid. Generally an alternating current rises when the circuit impedance decreases and this happens when the solenoid is no longer surrounded by a closed iron circuit. An air gap in the magnetic circuit could be caused by dirt preventing the armature from reaching its end position when the solenoid becomes energized.

The power shall be switched off at the isolator. The isolator shall be blocked in “off” position.

- Remedy the humming by cleaning the plunger and its housing.
- Replace the O-ring between solenoid and body when these items have been dismantled.

Certain types of solenoid valves take help from their working medium to close. These, called pilot controlled valves, are often equipped with an orifice in the diaphragm through which the working medium is admitted.

- Observe the location of the orifice while dismantling to enable for correct assembling.

Some solenoid valves have a preferred flow direction indicated by an arrow on the body. However, there are cases when the valve is fitted to face the flow, particularly where vacuum occurs.

- Therefore, check before removal, the way solenoid valves are directed in the piping system that they can be correctly refitted.

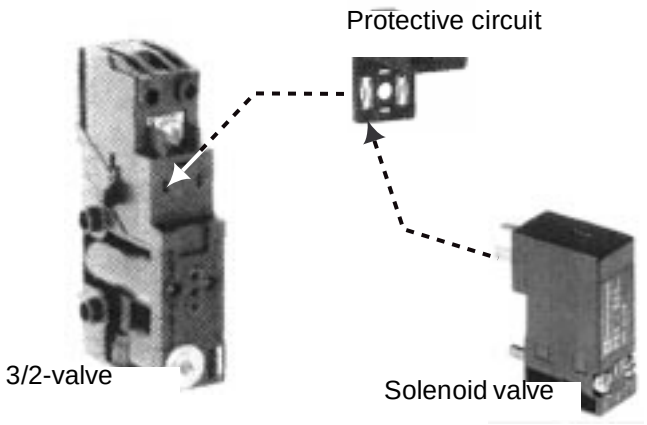
The rubber seal on solenoid valves operating in steam will age after a while. To avoid leakage it is recommended that the armature and the spring is replaced every second year.

VAX054 . . . . . Solenoid valve block 560 90 90

Solenoid valve block 560 90 90

The solenoid valve block is available in two executions:

1. Normally closed. Part number 560 90 90-70
2. Normally open. Part number 560 90 90-71



Integral parts

Solenoid valve block 560 90 90-70	
3/2-valve	560 90 90 - 01
Solenoid valve	560 90 90 - 05
Protective circuit	560 90 90 - 04

Solenoid valve block 560 90 90-71	
3/2-valve	560 90 90 - 02
Solenoid valve	560 90 90 - 05
Protective circuit	560 90 90 - 04

The 3/2-valve
is equipped with an pneumatic indicator showing white on normally closed modules and red on normally open ones.

The protective circuit
has a signal light showing power on to the valve block.

The solenoid valve
has a knob with which the valve can be operated manually. The valve is manually activated in position ”I” while it is operated by the control system in position ”O”

VAX069 . . . . . Pt 100 sensor (RTD)

Pt 100 sensor (RTD)

Metallic enclosur e:Acid-proof stainless steel (AISA 316 or similar)

Temperature range: 0 to +140 °C

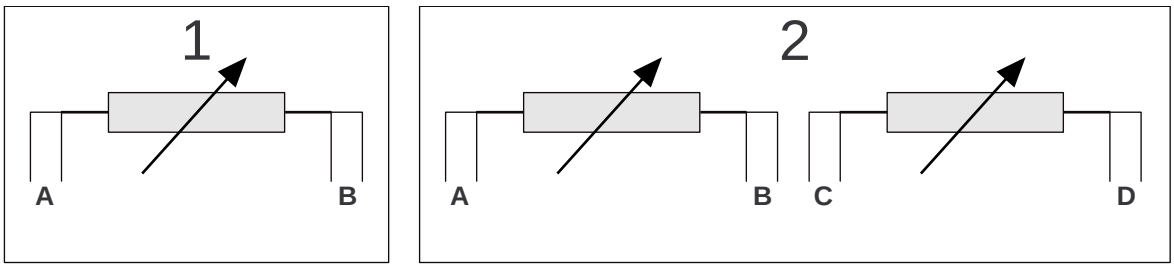
Working pressure :-1 to +3 bar

Standard: IEC 751-1983, Class A, four-wire.

Model	Cable		Type	Dia-gram	Metallic enclosure		
	Material*1	Length			Length	Diame-ter	Type
470 11 44 - 01	Silicone rubber	8 m	Single	Fig 1	150 mm	3 mm	Bent
470 11 44 - 02	Silicone rubber	8 m	Single	Fig 1	150 mm	3 mm	Straight
470 80 21 - 01	PVC	3 m	Single	Fig 1	120 mm	2.5 mm	Bent
470 80 21 - 02	PVC	5 m	Single	Fig 1	350 mm	3 mm	Bent
470 80 21 - 03	PVC	5 m	Single	Fig 1	260 mm	3 mm	Bent

470 80 21 - 04	PVC	8 m	Single	Fig 1	120 mm	3 mm	Bent
570 00 15 - 01	Silicone rubber	8 m	Double	Fig 2	150 mm	3 mm	Bent
570 00 15 - 02	PVC	2 x 5 m	Double	Fig 1	120 mm	3 mm	Straight
570 00 15 - 03	Silicone rubber	8 m	Double	Fig 2	150 mm	3 mm	Bent
570 00 15 - 04	PVC	2 x 5 m	Double	Fig 1	150 mm	3 mm	Bent

*1. Temperature sensors with silicone rubber cables are suitable for fitting inside the sterilizer.
Temperature sensors with PVC cables may be used only outside the sterilizer chamber (max. ambient temperature; 90 °C)



A = White	B = Red	C = Blue	D = Yellow

Pt 100 sensor (RTD)

Metallic enclosu re:Acid-proof stainless steel (AISA 316 or similar)

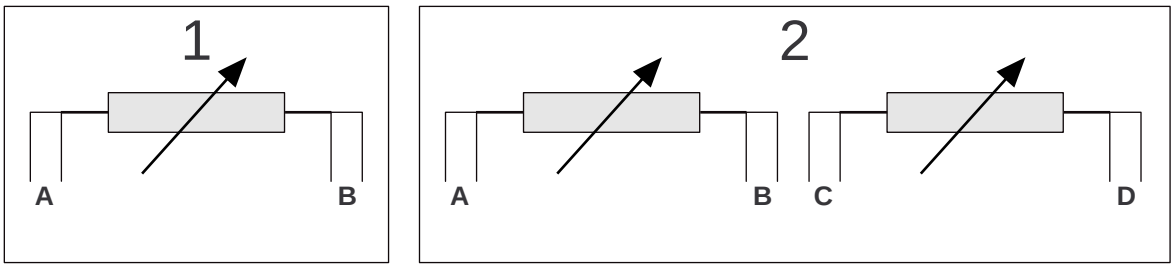
Temperature range: 0 to +140 °C

Working pressure :-1 to +3 bar

Standard: IEC 751-1983, Class A, four-wire.

Model	Cable		Type	Dia-gram	Metallic enclosure		
	Material	Length			Length	Diame-ter	Type
470 11 44 - 01	Silicone rubber	8 m	Single	Fig 1	150 mm	3 mm	Bent
470 11 44 - 02	Silicone rubber	8 m	Single	Fig 1	150 mm	3 mm	Straight
470 80 21 - 01	PVC	3 m	Single	Fig 1	120 mm	2.5 mm	Bent
470 80 21 - 02	PVC	5 m	Single	Fig 1	350 mm	3 mm	Bent
470 80 21 - 03	PVC	5 m	Single	Fig 1	260 mm	3 mm	Bent
470 80 21 - 04	PVC	8 m	Single	Fig 1	120 mm	3 mm	Bent
570 00 15 - 01	Silicone rubber	8 m	Double	Fig 2	150 mm	3 mm	Bent

Model	Cable		Type	Dia-gram	Metallic enclosure		
	Material	Length			Length	Diame-ter	Type
570 00 15 - 02	PVC	2 x 5 m	Double	Fig 1	120 mm	3 mm	Straight
570 00 15 - 03	Silicone rubber	8 m	Double	Fig 2	150 mm	3 mm	Bent
570 00 15 - 04	PVC	2 x 5 m	Double	Fig 1	150 mm	3 mm	Bent
570 06 93-01	Silicone rubber	3 m	Double	Fig 2	195 mm	4,5 mm	Bent
570 06 93-02	Silicone rubber	3 m	Double	Fig 2	260 mm	4,5 mm	Bent



A = White	B = Red	C = Blue	D = Yellow

Piston valves

Piston valves are used for various media as shut-off valves or as control valves with an on/off function. Such valves are normally maintenance-free, and so any maintenance or replacement is determined by long-term wear or by seal damage.

- Wear and tear can give rise to leakage in the actuator seal, the sleeve seals of the stainless steel pipe or in the valve body stem seal.
  If the valve is otherwise in good condition, such leakage can be cured by a renovation set.

Always replace seals, including any face seals in connections when dismantling the valves.

- Wear and tear in the valve actuator will give rise to leakage of compressed air to the surroundings. Leakage into the valve body and its media is prevented by a vent hole in the stainless steel guide tube.

- Wear and tear of the stainless steel pipe sleeve couplings can give rise to leakage between that part of the valve body that is connected to the top of the valve stem and the vent hole in the stainless steel pipe sleeve.
  Depending on how the valve is connected, such leakage can be detected by means of a leak test of the sterilizer or by leakage of media through the hole.
- Damage to, or dirt on, the valve body stem seal can cause leakage between the inlet and outlet sides of the valve. If the valve is connected to the sterilizer chamber, the easiest way to detect such leakage is by means of a leak test of the sterilizer.

Pressurise the actuator with compressed air when removing the valve body to replace the stem seal. This will compress the closing spring.

Beware of the risk of injury when removing the valve body or actuator, as both contain compressed springs.

Plate heat exchangers

The plate heat exchangers require little maintenance, but may need to be descaled every other year if the water is harder than 4 dH.

Proceed as follows:

- Remove the heat exchanger.
- Place the heat exchanger in a cleaning bath containing one of the acids listed below. If the positions of the connections allow this, the heat exchanger can instead be filled with one of the acids below.
  - 5% phosphoric acid
  - 5% oxalic acid
  - 10% citric acid

Do not use other acids or other concentrations than those listed above.

Working with acids may be dangerous. Follow the instructions and safety regulations of the chemical suppliers.

- Make sure that the heat exchanger is completely filled with liquid. Leave the heat exchanger in the bath for about one hour.
- Empty the heat exchanger and rinse it immediately with water.
- If the heat exchanger is heavily scaled, the treatment may need to be repeated. IF this happens, consider reducing the time between descaling operations.

Soldered plate heat exchangers

The performance of the plate heat exchangers is vital for correct operation of the sterilizer. Poor heat exchanger performance will automatically reduce the vacuum suction performance of the vacuum pump. This will, in turn, extend process times or, in the worst case, cause the process to fail, due to failure to reach the required vacuum conditions. In addition, poor vacuum pump performance can cause drying-out and thus indirectly overheating of the load, one of the effects of which would be to put the validation performance of the sterilizer at risk.

The plate heat exchangers normally require no maintenance, apart from possibly removing lime about every second year. If the water hardness exceeds 4 °dH, it may be necessary to clean the heat exchangers more often.

Blockage by lime generally tends to obstruct the cooling water inlet of the final heat exchanger first. Inspection there will therefore provide a good indication of the condition of the cooling system. The final heat exchanger is the one from which the discharge from the sterilize emerges.
Even though the heat exchangers may not be blocked, even modes deposits of lime can reduce their efficiency, and so regular cleaning is still recommended.

When they have been cleaned, the heat exchangers should also be pressure-tested. During normal operation, the pump circuit is under vacuum, while the cooling circuit is pressurised, which would mean that any leaks would reduce the performance of the vacuum pump. In addition, hygienic aspects must be considered. Pressure testing will reveal any leakage.

Cleaning

The first choice for cleaning is an environmentally-friendly and non-hazardous cleaner, specially developed for Getinge's plate hea exchangers. The cleaner (proprietary name: 'Limeclean') contains special ingredients and must not be confused with similar cleaners available on the open market.

Clean the heat exchangers as follows:

- Dismantle the heat exchanger.
- Read the instructions for using the cleaner and dilute it as instructed.
- The cleaning solution should be heated to about 55 °C for best effect. Alternatively, the heat exchanger can be filled with the cleaner and then heated up.
- Fill the heat exchanger with the diluted (and possibly heated) cleaning solution.
- Allow the solution to act for a few minutes if there is lime that is to be removed.
- Follow the instructions for handling, waiting time, emptying and rinsing of the cleaning solution.

In emergency, an alternative method can be used:

- Remove the heat exchanger.
- Place the heat exchanger in a cleaning bath containing one of the acids listed below. If the positions of the connections allow this, the heat exchanger can instead be filled with one of the acids below.
  - 5% phosphoric acid
  - 5% oxalic acid
  - 10% citric acid

Do not use other acids or other concentrations than those listed above.

Working with acids may be dangerous. Follow the instructions and safety regulations of the chemical suppliers.

- Make sure that the heat exchanger is completely filled with liquid. Leave the heat exchanger in the bath for about one hour.
- Empty the heat exchanger and rinse it immediately with water.

- If the heat exchanger is heavily scaled, the treatment may need to be repeated. IF this happens, consider reducing the time between descaling operations.

Always fit new gaskets to avoid leakage after having removed the connections to the heat exchangers.

Pressure testing

- Pressure-test each heat exchanger individually under water at a pressure of 3-6 bar(e). Pressure-test one side and check to see that water is not leaking out through the connections on the other side, or through the brazed joints.

Use only water as the pressure-testing medium, and do not exceed a pressure of 10 bar(e) when testing.

VAX048 . . . . . Small heat exchangers

After cleaning, swap the two small heat exchangers round so that the one that was first in the liquid flow is last. This facilitates self-cleaning of the heat exchangers.

VAX084 . . . . . Flow control, plate heat exchangers

Flow control

The flow through the cooling system should always be checked when the system is cleaned, as well as performing such a check occasionally in its own right.

Checking the flow rate through the heat exchangers will reveal not only clogging of the heat exchangers but also dirt in filters, choke washers or the cooling water valve. If flow control does not come up to performance, it indicates that the cooling is inefficient and that the cooling system needs to be cleaned. The symptoms are the same as those mentioned above.

Perform a flow check with the sterilizer in the stand-by mode.

- Connect a hose to the sterilizer cooling water outlet and find a suitable collection vessel with a capacity of 10 litres.
- Open the valve for minimum cooling of the condenser by a manual instruction from the operator's control panel. See also the PACS 2000 CONTROL UNIT chapter.

- Use a stop watch to measure the time taken to fill the vessel, and then calculate the flow rate.
- Repeat this procedure with the maximum cooling valve.
- Compare the measured flow rate with the values shown in the table below. A capacity reduction of 10% relative to the value shown in the table can be accepted. The values shown in the table may be exceeded if the water pressure is higher than specified.

VAX085 . . . . . . Sterilizers with ECO system

Pump model	Min. cooling 3 bar(e)	Max. cooling 3 bar(e)
LEM 25	1,7 l/min.	20 l/min.
LEM 50	2,2 l/min.	23 l/min.
LEM 90	3,5 l/min.	24 l/min.

The cooling flow rate is designed for an incoming water pressure of not less than 3 bar(e) and a temperature of not more than 20 °C. If the system pressure is regularly less than this, or if the temperature is exceeded, the cooling water flow rate should be increased through appropriate modifications to the system. Contact Getinge for further information.

If the results of the flow rate test are less than those shown in the table for the specified water pressure, the measures listed below should first be tried, before cleaning the heat exchangers.

- Inspect and clean the filter upstream of the cooling water valve.
- Remove the cooling water valve. Pull out the plastic strainer from its inlet connection and clean it.
- Dismantle the valve. Pull out the coloured constant-flow choke washer from the minimum cooling section, remove the O-ring in the choke washer and clean it.
- Remove the choke washer fitted to the heat exchanger in the vacuum pump circulating seal water circuit and clean it. This choke washer is fitted to the heat exchanger cooling water inlet in the form of a washer or sleeve.
- Refit the above components in the reverse order, remembering to replace the seals in the connections to the heat exchanger.

VAX086 . . . . . Sterilizers without ECO system

Pump model	Min. cooling 3 bar(e)	Max.cooling 3 ba(e)	Min. cooling 1 bar(e)	Max. cooling 1 bar(e)
LEM 25	2,7 l/min.	21 l/min.	1,7 l/min.	11 l/min.
LEM 50	4,6 l/min.	23 l/min.	3,1 l/min.	13 l/min.
LEM 90	4,6 l/min.	23 l/min.	3,1 l/min.	13 l/min.

As delivered, the cooling flow rate is designed for an incoming water pressure of not less than 3 bar(e) and a temperature of not more than 20 °C. A simple modification enables the sterilizer to be used down to a supply pressure of 1 bar(e) and up to a supply temperature of 35 °C. This means that the cooling water flow rates shown in the right-hand half of the table above can be accepted.
The method of making the change is described in the “Functions that can be programmed by the user" section of the GENERAL ADVICE chapter.

If the flow rate does not reach the values given in the table, the measures listed below should first be tried, before cleaning the heat exchangers.

- Inspect and clean the filter upstream of the cooling water valve.
- Remove the cooling water valve. Pull out the plastic strainer from its inlet connection and clean it.
- Dismantle the valve. Pull out the coloured constant-flow choke washer from the minimum cooling section, remove the O-ring in the choke washer and clean it.
- Reassemble in the reverse order.

VAX119 . . . . . Autoclaves without ECO system, without tropical setting >LEM 90

Pump model	Min-cool 3 bar(e)	Max-cool 3 ba(e)
LEM 250	28 l/min	75 l/min

The cooling flow is sized at the time of delivery for an incoming water pressure of at least 3 bar (e) and an incoming water temperature of 20°C maximum.
If the flow does not reach the value indicated in the table, the action

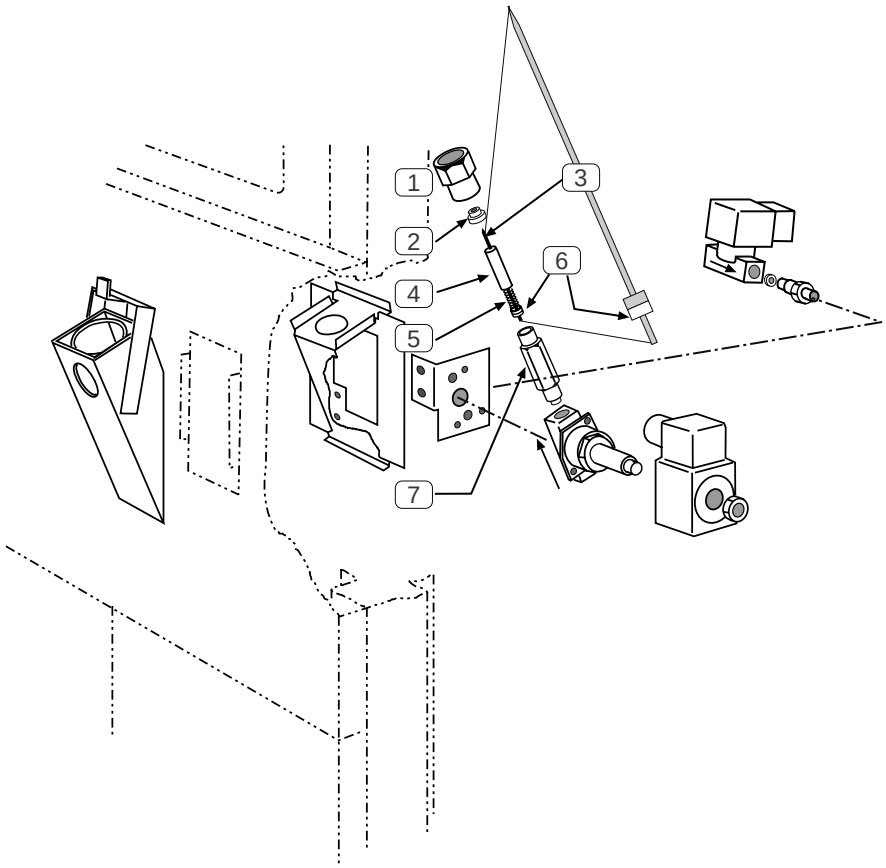
indicated below should firstly be taken, and only after that has been done should cleaning of the heat exchanger be carried out.

- Check and clean the dirt filter for incoming cooling water.

Formaldehyde injector

Removal of cannula

1. Screw off the cannula protection 1 by hand.
2. Take care of the bushing 2.
3. Pull out the cannula 3 carefully so as to simultaneously remove the spacer sleeve 4 and the helical spring 5. It is important that the teflon gasket 6 fitted on to the lower part of the cannula also comes with, as it must otherwise be picked up with any suitable tool.



Assembling the cannula unit

Use an empty formaldehyde bottle with the rubber plug still fitted as an assembly fixture for the cannula unit.

1. Place the cannula protection 1 over the rubber plug of the erected bottle.
2. Replace the bushing 2 in the cannula protection and make sure it gets into place correctly.
3. Slip the helical spring 5 and the spacer sleeve 4 on to the cannula 3.
4. Push a new teflon gasket 6 on the lower part of the cannula.
5. Push the cannula point through the bushing 2 of the cannula protection 1 and further into the bottle rubber plug to make it stick in this.
6. While kept together by the bottle, insert the cannula assembly via the bottle holder into the needle guide 7.
7. Attach the cannula protection by threading it on to the needle guide 7, while using the bottle as a handle.
   Pull the bottle out and tighten the Cannula protection by hand.

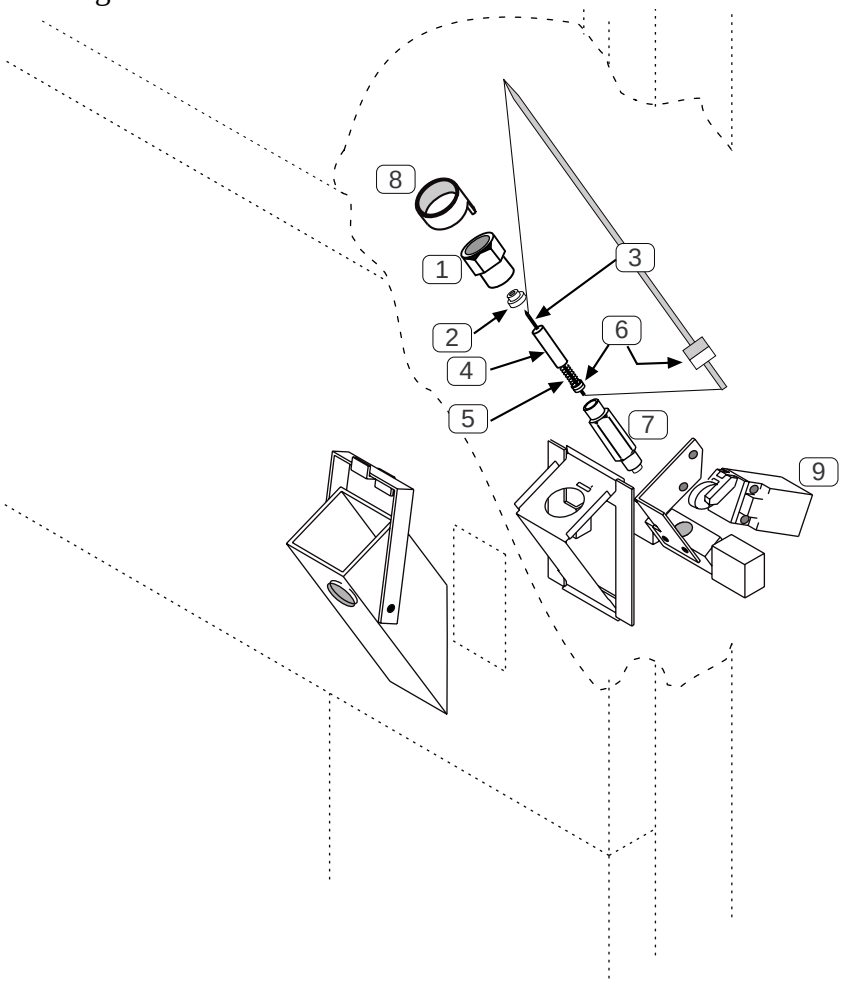
VAX116 . . . . . Formalineinspritzer

Formalin injector

Removal of syringe

1. Lift off the bottle detector 8.
2. Unscrew the syringe guard 1 by hand.
3. Take hold of bush 2.
4. Carefully pull up syringe 3, accompanied by spacer sleeve 4 and compression spring 5. Check that the teflon seal 6 is still in position

on the end of the syringe. If this is not the case, it must be fished up using a suitable tool.



Fitting syringe

Use an empty formalin bottle with cork inserted as a mounting fixture for syringe assembly.

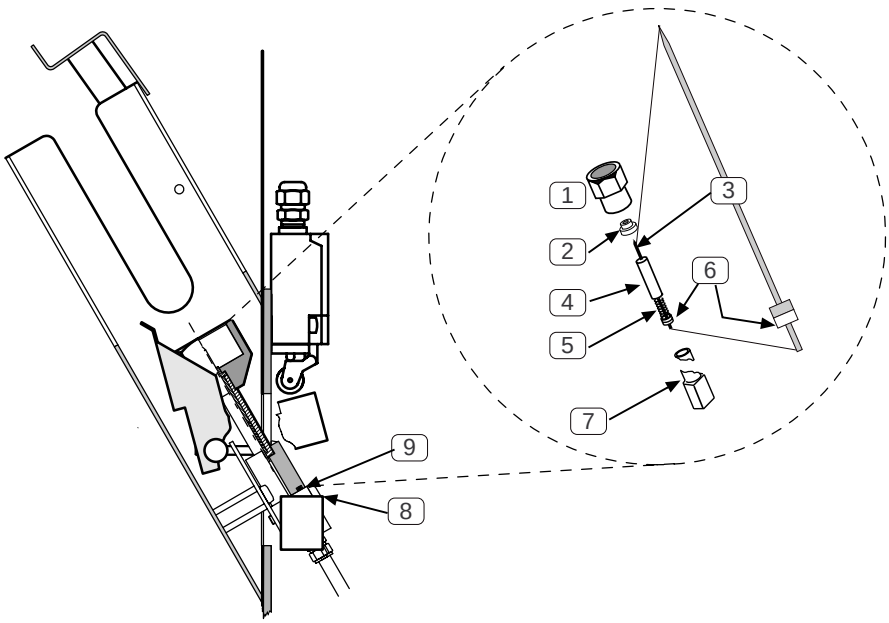
1. Place injection needle guard 1 over the cork of the bottle facing the right way.
2. Insert bush 2 into the syringe guard and make sure that it goes in the right place.
3. Thread compression spring 5 and spacer sleeve 4 onto needle 3.
4. Put a new teflon seal 6 on the lower part of the needle.
5. Press the tip of the needle through bush 2 in the needle protection and on through the rubber cork of the bottle so that the needle sits firmly in this.
6. Guide the syringe assembly down in the needle guide 7 via the bottle holder while it is held firm in the bottle.

7. Screw the syringe guard tight on the needle guide 7 using the bottle. Pull the bottle away and re-tighten by hand.
8. Insert the bottle detector 8 and check that it ends up against the limit switch 9.

Formalin injector

Removing the cannula

1. Using a polygrip wrench, grip the needle guide (7) behind the front plate and turn it to undo the threaded joint with the valve (8).
2. Grip the needle guard (1) in the bottle-holder from the front and unscrew the released part of the formalin injector by hand. Pull it out of the bottle-holder and check that the O-ring (9) comes with it.
3. Unscrew the needle guard (1).
4. Collect the bushing (2).
5. Carefully pull out the cannula (3), in such a way as also to remove the spacer sleeve (4) and the spring (5). Check that the Teflon© seal (6) is still on the lower end of the cannula: if not, it must be removed using a suitable tool.



Assembling the cannula unit

> **Use an empty formalin bottle with the rubber plug still fitted as an assembly fixture for the cannula unit.**

1. Place the cannula protection 1 over the rubber plug of the erected bottle.
2. Replace the bushing 2 in the cannula protection and make sure it gets into place correctly.
3. Slip the helical spring 5 and the spacer sleeve 4 on to the cannula 3.
4. Push a new teflon gasket 6 on the lower part of the cannula.
5. Push the cannula point through the bushing 2 of the cannula protection 1 and further into the bottle rubber plug to make it stick in this.
6. Pass the needle guide (7) over the cannula assembly and screw it into the needle guard (1) by hand.
7. Replace the O-ring (9) and fit the entire assembly via the bottle-holder while it is held in the bottle.
8. Pull off the bottle and tighten the needle guide carefully behind the front plate, using a polygrip wrench.

VAX102 . . . . . Moisture meter for ETO sterilizers

MOISTURE METER

Moisture meter for ETO sterilisers

Principle of operation

The moisture meter is built around a Getinge PACS 2000 control system. The principle of measurement is based on a comparison between wet and dry temperature in the steriliser chamber.

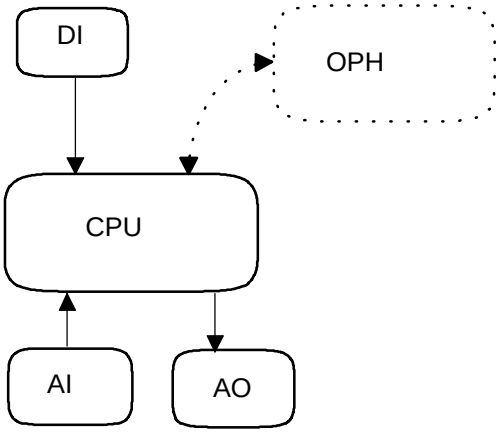
The temperature sensors are located in pairs, where one sensor is kept constantly wet (T_{wet}) by being connected to a water container with a wick. The other sensor is dry (T_{dry}). The relative moisture is calculated as follows::
P_{wet} = saturation pressure of the water vapour at T_{wet}

P_{dry} = saturation pressure of the water vapour at T_{dry}

$$rH = \frac{P_{wet}}{P_{dry}} \times 100$$

This calculation model is adapted to an atmosphere which predominantly consists of vapour.

The measured value from the moisture meter is represented by a 4-20 mA signal, where 4 mA represents 0% and 20 mA signifies 100% rH).



Documentation

Normal documentation/printout is dealt with by the control system of the steriliser, which reads off the 4-20 mA signal provided by the moisture meter. The relative moisture can be printed out as an ordinary parameter from the control system.

If the moisture meter is connected to a PC (OPH), the temperatures can additionally be logged on file. When logging takes place, the control system sends a signal to the digital input of the moisture sensor, and the moisture sensor then creates a file on the PC. This file contains all the temperatures and rH values which are logged during the time when the digital input is activated.

Each logging is saved with a unique file name which is constructed according to the model YYMMDDXX.lst, where YY is the last two digits of the year, MM is the month, DD is the day and XX is a seria number starting with 00 for the first log file of the day. The second log file saved on 30.06.1997 thus receives the file name 97063001.lst.

Identification

In order to be able to distinguish central processing units (CPUs) belonging to different control systems, Supervisors and moisture meters from each other, each CPU has an identification. This identification is normally constructed so that control system no. 1 has Supervisor no. 51,

where appropriate, and moisture sensor 81, control system 2 has Supervisor 52 and moisture sensor 82.

Calibration

Calibration is performed using an OPC or OPH, see the description of the control system.

Passwords

Passwords are required to access various menus when working with OPC/OPH. When delivered, the unit is programmed with the same passwords as the control system.

VAA012 . . . . . Introduction, steam generator, 19 - 60 kW

Electric steam generator

The steam needed to supply the sterilizer is usually supplied from the building's central boiler plant. If there is no such central boiler plant, or if there is reason for not using it, the sterilizer can be supplied with steam from a fully automatic steam generator, using electric immersion heaters as the heat source.

Operating principle

The heating power is split up among a number of heating elements. The power supply to them is controlled by a pressure switch having double changeover contacts, one for each heater element circuit. One contact group controls the normal operating pressure, while the other controls re-engagement of heating power when the minimum steam pressure has been reached.

A steam pressure higher than that shown on the electric circuit diagram should not be set, as this will mean that the steam will be superheated when admitted to the sterilizer chamber. On the other hand, if the operating pressure is allowed to drop too much, the steam will be wet. Both types of steam are unsuitable for use in sterilization applications.

A feed water tank supplies the steam generator with water from an integral water tank with an anti-siphon air breaker. The water level in the steam generator is sensed by a level control device that controls the pump to maintain the water level in the steam generator almost constant. A boil-dry protection device in the level control device interrupts the supply of power to the heating elements in the event of low water level.

VAA020 . . . . . Introduction, steam converter

Steam generator

The steam needed to supply the steriliser is usually taken from the central steam plant of the building. If the quality of this steam makes it unsuitable for sterilising purposes, the steriliser can be fitted with its own steam generator, which generates clean steam with the aid of the centrally produced steam.

Principle of operation

A feedwater pump supplies the steam generator with water from a built-in water tank with air trap. The water level of the steam generator is sensed by a level device which controls the operation of the pump so that the level is kept practically constant. A protection feature incorporated in the same device cuts off the supply of primary steam if the water level is low.

The water in the steam generator is made to boil by primary steam at a pressure of 6 - 7 bar(e), which passes through the steam generator in a pipe coil. The steam which forms collects at the top of the stea generator. The pressure of the secondary steam is kept constant a 2.8 bar(e) by a reducing valve.

VAA024 . . . . . Components, integral steam generator

Safety components

Each steam generator incorporates a number of components, of which some are specifically intended for safety purposes. These components are marked, and must be treated in the same way as other safety components on the sterilizer.

Apart from the safety valve, the safety components are described separately in the 'Steam generator settings and controls' section in the GENERAL ADVICE chapter.

Safety valve

In the event of failure of the pressure control system, the safety valve provides the final protection against exceeding the design pressure of the steam vessel. See also the test instructions in the 'Quarterly inspection' section of the MAINTENANCE chapter.

Control switch

The control switch is common to that for the sterilizer. Sterilizers having double steam systems include an extra shutdown pushbutton, marked 'Steam generator'.

Water level control

An LED in the sterilizer instrument panel indicates correct water level in the steam generator. On certain models, the water level can also be seen in a sight glass.

Delayed water filling stop

The timer relay prevents the feed water pump from stopping in response to a temporary fall of water level below the boil-dry safety level.

Overfill protection

The timer relay prevents the steam generator from being overfilled if the level control system fails to work.

Delay relay, heating

This relay prevents abnormal wear on the heating element contactors by preventing full power from being switched on in response to brie draw-offs of steam.

Key switch

This switch overrides the operating pressure control system. When turned to the safety valve test position or, in appropriate cases, to the safety pressure switch test position, the steam generator produces steam continuously.

VAA021 . . . . . Components, integral steam converter

Safety components

Each steam converter incorporates a number of components, of which some are specifically intended for safety purposes. These components are marked, and must be treated in the same way as other safety components on the sterilizer.

Safety valve

In the event of failure of the pressure control system, the safety valve provides the final protection against exceeding the design pressure of

the steam vessel. See also the test instructions in the 'Quarterly inspection' section of the MAINTENANCE chapter.

Control switch

The control switch is common to that for the sterilizer. Sterilizers having double steam systems include an extra shutdown pushbutton marked 'Steam generator'.

Water level control

An LED in the sterilizer instrument panel indicates correct water level in the steam generator. On certain models, the water level can also be seen in a sight glass.

Delayed water filling stop

The timer relay prevents the feed water pump from stopping in response to a temporary fall of water level below the boil-dry safety level.

Keyswitch

When the key is in the “Check safety valve” position, steam is produced continuously, regardless of the setting of the reducing valve.

VAA025 . . . . . .New steam generator, 38-60 kW

Reset pushbutton

If the boil-dry protection has tripped as a result of low water level, the water level must be restored using the Reset Level pushbutton. The pushbutton must be held pressed for about a further ten seconds after the indicating lamp in the pushbutton lights.

Test pushbutton, boil-dry protection

The 'Test Level Limiter' pushbutton enables a quick test of the boil-dry protection to be performed. The test interrupts the electrode circu without having to reduce the water level.

Spark-reduction connection

Besides reducing the life of electric contacts, sparking in them also introduces a risk of interference with electronic equipment in the vicinity.

Sparking protection is provided by a high-speed auxiliary relay which is connected after the slowly-breaking contacts in the operating pressure switch, thus virtually eliminating sparking in the switch.

Level control and boil-dry protection by electrode sensing

The purpose of the level control device is to sense and control the water level in the steam generator. The main components consist of a sensitive relay and two electrodes, the ends of which are in contact with the water at the upper and lower water levels. Contact of the water with the upper electrode stops the feed pump, while loss of contact with the lower electrode starts the pump. A third electrode, positioned lower still, interrupts the supply to the heating elements if it loses contact with the water.

The type and sensitivity of the level control relay can be adjusted to suit a range of conductivities of the water. An 'insensitive' level control relay is required when using untreated or softened feed water, with its sensitivity being reduced as the conductivity of the water increases.
If, however, the feed water has been de-ionised, then a high-sensitivity level control relay is required, with its sensitivity being increased as the conductivity of the water decreases.

Too low a sensitivity of the relay brings a risk of it failing to respond to the water level, resulting in overfilling of the steam generator. Too high a sensitivity, on the other hand, introduces a risk of the relay responding to a water film, foam or water droplets on the electrode insulators, which would interrupt water filling.

The design of the electrodes, and their mutual separation, is a further factor that affects the overall sensitivity of the level control device. Getinge's electrode design allows water ranging from good quality untreated water right up to de-ionised water having a conductivity as low as 0.1 on with the appropriate relay For more information on adjusting the sensitivity, see the 'Steam generator settings and controls' section in the GENERAL ADVICE chapter.

Service, level control device

It may be necessary to remove the level control electrodes for internal inspection, cleaning or service.

Dismantle the level control electrode system as little as possible, i.e. no more than is needed to perform the required work. When refitting, new O-rings must be used and, in certain cases, be fitted using special tools.

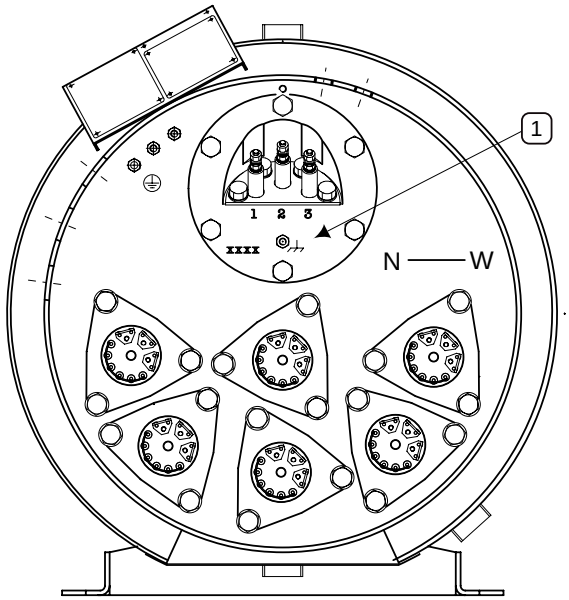
Before all dismantling

Interrupt the current by opening the system disconnector and lock it in the open position.

- Empty the steam generator by opening its drain valve. Leave the valve open.

Warning: Risk of scalding or hearing damage from discharged steam.

Removing the level control device



- Remove the cover from the end of the steam generator and disconnect the wires to the level control device.

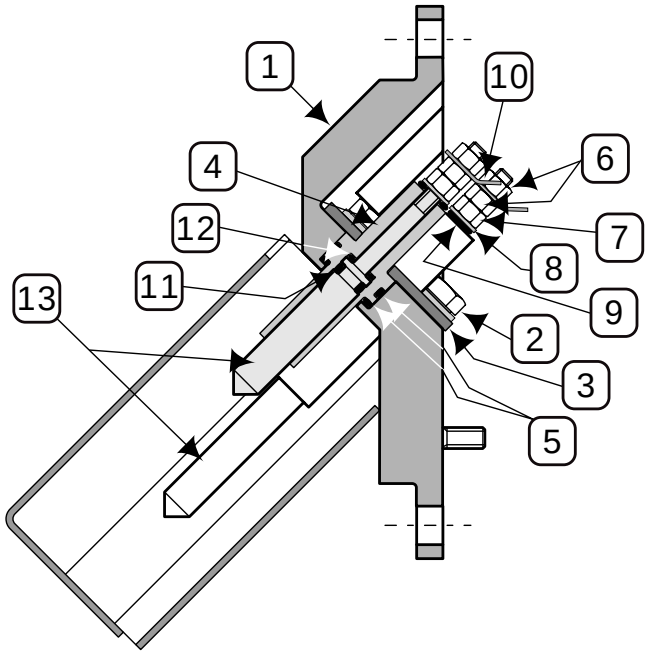
Mark the wires and connections: incorrect reassembly can cause danger.

- Remove the six screws in the level control device flange (01) and remove the device.

Refitting the level control device

- Fit a new gasket and lubricate the screws with Molykote 1000.
- Fit the level control device and tighten the screws alternately to a torque of 23 Nm.

- Close the steam generator drain valve and check for pressure-tightness at operating pressure.



Removing the level-sensing electrode and insulating sleeve

- Slacken the screws (02) alternately and remove the clamp (03) after having marked its upper side.
- Mark the electrodes with the figures stamped in the flange (01). As the electrodes are of different lengths, it is important that they are not interchanged.
- Pull out the electrodes with their insulating sleeves (04) and O-rings (05).

Refitting the level-sensing electrode and insulating sleeve

- Replace both the O-rings (05) with rings having an internal diameter of 15.3 mm and refit the complete level-sensing electrode in the level control device (01). In order to be able to compress the radially sealing O-ring, the level-sensing electrode has to be pressed into a special fitting sleeve. Press the electrode so that it bottoms against the second O-ring, using soapy water as a lubricant if necessary.
- Fit the clamp washer (03) with the marked side upwards, smear the screws (02) with Molykote 1000 and tighten them alternately to a torque of 23 Nm.

Removing the electrode from its insulating sleeve

- Start by removing the level-sensing electrode as described above.
- Remove the locknuts (06) and the electrical connection tab (10).
- Unscrew the nut (07), remove the washer (08) and the O-ring (09).
- Holding the electrode (13) by its water-sensing tip, pull it out of the sleeve (04) together with the O-rings (11) and (12).

Refitting the electrode in its insulating sleeve

- Fit a new O-ring (11) with an internal diameter of 5.3 mm and a second O-ring (12) with an internal diameter of 4.3 mm, on the electrode (13), using a fitting sleeve.
- Refit the electrode (13) in its insulating sleeve (04). Fit the O-ring (09) with an internal diameter of 4.3 mm, using a fitting sleeve.
- Fit washer (08) and tighten nut (07) by hand. Tighten the nut by a further one turn.

Always fit new genuine O-rings, made of the correct material, when dismantling and reassembling. Do not damage the O-rings, and note that O-rings (11) and (12) are not of the same size.

Servicing the electric heating elements

Interrupt the current by opening the system disconnector and lock it in the open position.

Disconnecting the heating element in the event of exceeding the rated current

In particularly unfavourable cases, the power rating tolerance and the mains supply voltage tolerance may act together in such a way as to overload even a correctly rated main fuse and blow it.
These unfavourable conditions tend to occur primarily when a 100 A main fuse is specified, as the rated current and fuse rating are then relatively close to each other.
If this occurs, a heating element in the full-power group can be disconnected. See also the connection data in the INSTALLATION chapter.

Removing a heating element

The procedure described below is also applicable to replacement of the heating element gasket or removal of the lower element for cleaning.

- Empty the steam generator by opening the drain valve. Leave the valve open.

Warning: Risk of scalding or hearing damage from discharged steam.

- Remove the cover over the heater element terminals on the end of the steam generator and remove the supply cables.
- Mark the wires and connections: incorrect reassembly can cause danger.
- Remove and replace the faulty elements.

Refitting heating elements

- Always fit a new gasket when refitting heating elements.
- Lubricate the securing screws with Molykote 1000.
- Fit the cap and tighten the screws alternately by a quarter of a turn at a time to a torque of 28 Nm.
- If closing links are used, make sure that they are in series with the elements and not in parallel.
- Close the boiler drain valve and check for pressure-tightness at operating pressure.
- Refit other parts that were removed.

VAA031 . . . . . New steam generator 19 kW

Spark-reducing connection

As well as reducing the life of electrical contacts, sparking in these contacts always involves a risk of causing interference to electronic equipment in the vicinity.
The spark protection is based on a rapidly operating auxiliary relay relieving the load on the slowly breaking contacts in the pressure switch for operating pressure so that sparking is largely eliminated.

Overfilling protection

A time relay interrupts the topping-up of water if the level regulation ceases to function.

Level regulation and boiling-dry protection through sensing with electrodes

The task of the level device is to sense and control the water level of the steam generator. The main components consist of a sensitive relay and two electrodes, the ends of which touch the water surface at the upper and lower topping-up levels. The contact of the upper electrode with the water stops the feed water pump while the lower electrode's lack of contact starts the pump. A third electrode, located lowest down, interrupts the power supply to the heating elements when the electrode loses contact with the water.

The type and sensitivity of the level relays can be adapted to varying conductivity in the water. When the feed water is untreated or softened, a "non-sensitive" level relay is required where the setting of the sensitivity is reduced with increasing water conductivity.
If the feed water is deionised, on the other hand, a level relay with high sensitivity is required, where the setting of sensitivity increases with decreasing water conductivity.

If the sensitivity of the relay is too low, there is a risk of it not being able to sense the water surface, with the result that the steam generator is overfilled.
If the sensitivity is too high, there is a risk that the relay may react to a water film, foaming or drops on the electrode insulators so that the water is not topped up.

The design and mutual spacing of the electrodes are another factor affecting the total sensitivity of the level device.
Getinge's electrode design is adapted so that untreated water of good quality as well as deionised water with a conductivity down to 0.1 µS/cm can be used for the steam generator together with level relay adapted for the purpose. For further information concerning the setting of sensitivity, see the section headed "Steam generator settings and checks" in the chapter on ADVICE AND INSTRUCTIONS.

Servicing level device

The level electrode device may need to be disassembled for internal inspection, cleaning or servicing on the electrodes.

Disassemble as little as possible so that the desired action can be carried out. When re-fitting, O-rings must be replaced and in some cases fitted using special tools.

Before all disassembly.

Disconnect the power on the unit's safety switch and lock it.

- Drain the steam generator by opening the drain valve. Leave the valve open.

Be aware of the risk of burns and noise when steam emerges.

Disassembly of level device

- Disconnect the level device wiring.

Mark leads and connections. Incorrect refitting may create danger.

- Disconnect the four screws in the flange of the level device and lift it out.

Refitting level device

- Fit a new seal and lubricate the screws with Molykote 1000.
- Fit the level device and tighten the screws alternately until a torque of 17 Nm is achieved.
- Close the drain valve and check leaktightness at operating pressure.

Always replace with original O-rings made of the correct material when disassembling.

Servicing on electrical elements.

Disconnect the power on the unit's safety switch and lock it.

Disconnecting heating elements
The procedure described is also to be applied in replacing element packing or disassembling the lower element for cleaning.

- Drain the steam generator by opening the drain valve. Leave the valve open.

Be aware of the risk of burns and noise when steam emerges.

- Remove the shock protection over the electrical connections of the elements on the side of the vessel and disconnect the power cables.

Mark leads and connections. Incorrect refitting may create danger.

- Remove and replace defective elements.

Refitting heating elements

- Always fit a new seal when refitting elements.
- Lubricate the securing screws with Molykote 1000.
- Put on the cap and tighten the screws alternately a quarter-turn until the torque of 28 Nm is reached.
- If closing links are used, make sure that these are in series with the elements and not in parallel.
- Close the drain tap and check leaktightness under pressure.
- Reset other disassembled parts.

VAA034 . . . . . .New steam generator, 38-60 kW with level electrodes

Reset pushbutton

If the boil-dry protection has tripped as a result of low water level, the water level must be restored using the Reset Level pushbutton. The pushbutton must be held pressed for about a further ten seconds after the indicating lamp in the pushbutton lights.

Test pushbutton, boil-dry protection

The 'Test Level Limiter' pushbutton enables a quick test of the boil-dry protection to be performed. The test interrupts the electrode circu without having to reduce the water level.

Spark-reduction connection

Besides reducing the life of electric contacts, sparking in them also introduces a risk of interference with electronic equipment in the vicinity.

Sparking protection is provided by a high-speed auxiliary relay which is connected after the slowly-breaking contacts in the operating pressure switch, thus virtually eliminating sparking in the switch.

Level control and boil-dry protection by electrode sensing

The purpose of the level control device is to sense and control the water level in the steam generator. The main components consist of a sensitive relay and two electrodes, the ends of which are in contact with the water at the upper and lower water levels. Contact of the water with the upper electrode stops the feed pump, while loss of contact with the lower electrode starts the pump. A third electrode, positioned lower still, interrupts the supply to the heating elements if it loses contact with the water.

The type and sensitivity of the level control relay can be adjusted to suit a range of conductivities of the water. An 'insensitive' level control relay is required when using untreated or softened feed water, with its sensitivity being reduced as the conductivity of the water increases.
If, however, the feed water has been de-ionised, then a high-sensitivity level control relay is required, with its sensitivity being increased as the conductivity of the water decreases.

Too low a sensitivity of the relay brings a risk of it failing to respond to the water level, resulting in overfilling of the steam generator. Too high a sensitivity, on the other hand, introduces a risk of the relay responding to a water film, foam or water droplets on the electrode insulators, which would interrupt water filling.

The design of the electrodes, and their mutual separation, is a further factor that affects the overall sensitivity of the level control device. Getinge's electrode design allows water ranging from good quality untreated water right up to de-ionised water having a conductivity as low as 8 µS on with the appropriate relay. For more information on adjusting the sensitivity, see the 'Steam generator settings and controls' section in the GENERAL ADVICE chapter.

Service, level control device

It may be necessary to remove the level control electrodes for internal inspection, cleaning or service.

Dismantle the level control electrode system as little as possible, i.e. no more than is needed to perform the required work. When refitting, new O-rings must be used and, in certain cases, be fitted using special tools.

Before all dismantling

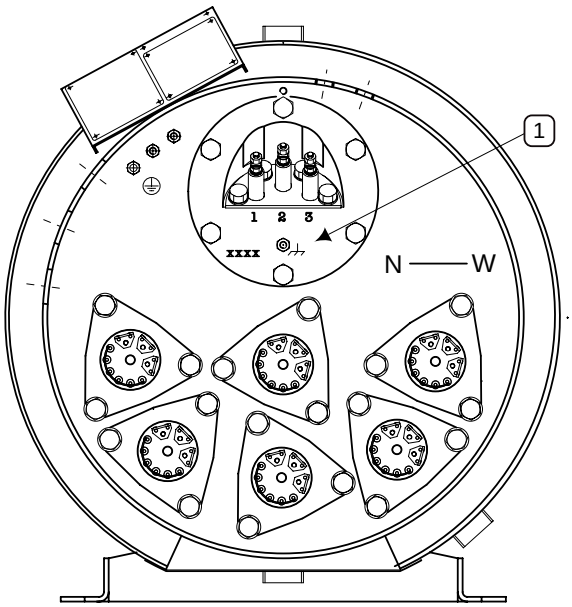
Interrupt the current by opening the system disconnector and lock it in the open position.

Make sure the door is resting securely on the prop!

- Empty the steam generator by opening its drain valve. Leave the valve open.

Warning: Risk of scalding or hearing damage from discharged steam.

Removing the level control device



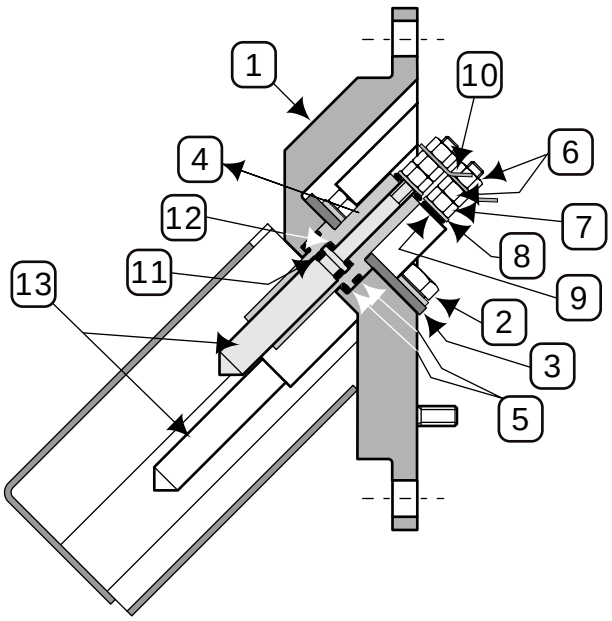
- Remove the cover from the end of the steam generator and disconnect the wires to the level control device.

Mark the wires and connections: incorrect reassembly can cause danger.

- Remove the six screws in the level control device flange (01) and remove the device.

Refitting the level control device

- Fit a new gasket and lubricate the screws with Molykote 1000.
- Fit the level control device and tighten the screws alternately to a torque of 23 Nm.
- Close the steam generator drain valve and check for pressure-tightness at operating pressure.



Removing the level-sensing electrode and insulating sleeve

- Slacken the screws (02) alternately and remove the clamp (03) after having marked its upper side.
- Mark the electrodes with the figures stamped in the flange (01). As the electrodes are of different lengths, it is important that they are not interchanged.
- Pull out the electrodes with their insulating sleeves (04) and O-rings (05).

Refitting the level-sensing electrode and insulating sleeve

- Replace both the O-rings (05) with rings having an internal diameter of 15.3 mm and refit the complete level-sensing electrode in the level control device (01). In order to be able to compress the radially sealing O-ring, the level-sensing electrode has to be pressed into a special fitting sleeve. Press the electrode so that it bottoms against the second O-ring, using soapy water as a lubricant if necessary.

- Fit the clamp washer (03) with the marked side upwards, smear the screws (02) with Molykote 1000 and tighten them alternately to a torque of 23 Nm.

Removing the electrode from its insulating sleeve

- Start by removing the level-sensing electrode as described above.
- Remove the locknuts (06) and the electrical connection tab (10).
- Unscrew the nut (07), remove the washer (08) and the O-ring (09).
- Holding the electrode (13) by its water-sensing tip, pull it out of the sleeve (04) together with the O-rings (11) and (12).

Refitting the electrode in its insulating sleeve

- Fit a new O-ring (11) with an internal diameter of 5.3 mm and a second O-ring (12) with an internal diameter of 4.3 mm, on the electrode (13), using a fitting sleeve.
- Refit the electrode (13) in its insulating sleeve (04). Fit the O-ring (09) with an internal diameter of 4.3 mm, using a fitting sleeve.
- Fit washer (08) and tighten nut (07) by hand. Tighten the nut by a further one turn.

Always fit new genuine O-rings, made of the correct material, when dismantling and reassembling. Do not damage the O-rings, and note that O-rings (11) and (12) are not of the same size.

Servicing the electric heating elements

Interrupt the current by opening the system disconnector and lock it in the open position.

Make sure the door is resting securely on the prop!

Disconnecting the heating element in the event of exceeding the rated current

In particularly unfavourable cases, the power rating tolerance and the mains supply voltage tolerance may act together in such a way as to overload even a correctly rated main fuse and blow it.

These unfavourable conditions tend to occur primarily when a 100 A main fuse is specified, as the rated current and fuse rating are then rela-

tively close to each other.
If this occurs, a heating element in the full-power group can be disconnected. See also the connection data in the INSTALLATION chapter.

Removing a heating element
The procedure described below is also applicable to replacement of the heating element gasket or removal of the lower element for cleaning.

- Empty the steam generator by opening the drain valve. Leave the valve open.

Warning: Risk of scalding or hearing damage from discharged steam.

- Remove the cover over the heater element terminals on the end of the steam generator and remove the supply cables.
- Mark the wires and connections: incorrect reassembly can cause danger.
- Remove and replace the faulty elements.

Refitting heating elements

- Always fit a new gasket when refitting heating elements.
- Lubricate the securing screws with Molykote 1000.
- Fit the cap and tighten the screws alternately by a quarter of a turn at a time to a torque of 28 Nm.
- If closing links are used, make sure that they are in series with the elements and not in parallel.
- Close the boiler drain valve and check for pressure-tightness at operating pressure.
- Refit other parts that were removed.

Technical data

19 kW STEAM GENERATOR

Pressure vessel	Volume	2
	Water volume	10 l
	Design pressure	3.5 bar
	Jacket material	W. Nr. 1.4571
	Jacket thickness	3 mm
Capacity	Steam production	25kg/hour
	safety valve dim. for	145 kg/hour
	Minimum capacity of feed water pump at constant operating pressure:	
	Stainless steel version	0.92 l/min
	Maximum topping-up time for feed water pump at constant operating pressure:	
	Stainless steel versions	36 sec
Electrical data	Heating power	19 kW
	Power of feed water pump	0.5 kW
Immersion heaters	Material	SS2378 (254 SMO)
	Power	3 x 6.3 kW
Sensitivity of level	Float version	--------
	Level relay with normal sensitivity	5 — 100 kohm
	Level relay with high sensitivity	50 kohm — 1Mohm
Other data	Sound level	<70 dBA
	Weight empty	50 kg
	Weight filled with water (tank also)	78 kg
To be supplied by the purchaser	Connection voltage	See apparatus specification
	Group fuse	See data plate electrical junction box
	Earth-fault switch	300 mA

Technical data

38 KW STEAM GENERATOR

Pressure vessel	Gross volume	52 l
	Water volume	31 l
	Design pressure	3,5 bar
	Shell material	W. Nr. 1.4571
	Shell thickness	4 mm
Capacities	Steam production	56 kg/tim.
	Safety valve rated for	255 kg/tim.
	Min. feed pump capacity at constant operating pressure:	
	Stainless steel type	2,8 l/min
	Maxi. filling time for feed pump at constant operating press.:	
	Stainless steel type	46 sek
Electrical data	Heating power	38 kW
	Feed pump rating	0,5 kW
Heating elements	Material	SS2378 (254 SMO)
	Power	6 x 6,3 kW
Level control sensitivity	Float type	--------
	Normal sensitivity	0,25 - 5 kohm
	High sensitivity	5 - 100 kohm
Other data	Noise level	<70 dBA
	Empty weight	110 kg
	Weight, water-filled (includes tank)	165 kg
To be supplied by purchaser	Supply voltage	See apparatus specification
	Group fuse	See rating plate, electrical connection cubicle
	RCD	300 mA

GETINGE

Technical data

40 KW STEAM GENERATOR

Pressure vessel	Gross volume	52 l
	Water volume	31 l
	Design pressure	3,5 bar
	Shell material	W. Nr. 1.4571
	Shell thickness	4 mm
Capacities	Steam production	59 kg/tim.
	Safety valve rated for	255 kg/tim.
	Min. feed pump capacity at constant operating pressure:	
	Stainless steel type	1,9 l/min
	Maxi. filling time for feed pump at constant operating press.:	
	Stainless steel type	44 sek
Electrical data	Heating power	40 kW
	Feed pump rating	0,5 kW
Heating elements	Material	SS2378 (254 SMO)
	Power	4 x 10 kW
Level control sensitivity	Float type	--------
	Normal sensitivity	0,25 - 5 kohm
	High sensitivity	5 - 100 kohm
Other data	Noise level	<70 dBA
	Empty weight	110 kg
	Weight, water-filled (includes tank)	165 kg
To be supplied by purchaser	Supply voltage	See apparatus specification
	Group fuse	See rating plate, electrical connection cubicle
	RCD	300 mA

Technical data

50 KW STEAM GENERATOR

Pressure vessel	Gross volume	52 l
	Water volume	31 l
	Design pressure	3,5 bar
	Shell material	W. Nr. 1.4571
	Shell thickness	4 mm
Capacities	Steam production	73 kg/tim.
	Safety valve rated for	255 kg/tim.
	Min. feed pump capacity at constant operating pressure:	
	Stainless steel type	2,4 l/min
	Maxi. filling time for feed pump at constant operating press.:	
	Stainless steel type	35 sek
Electrical data	Heating power	50 kW
	Feed pump rating	0,5 kW
Heating elements	Material	SS2378 (254 SMO)
	Power	5 x 10 kW
Level control sensitivity	Float type	--------
	Normal sensitivity	0,25 - 5 kohm
	High sensitivity	5 - 100 kohm
Other data	Noise level	<70 dBA
	Empty weight	110 kg
	Weight, water-filled (includes tank)	165 kg
To be supplied by purchaser	Supply voltage	See apparatus specification
	Group fuse	See rating plate, electrical connection cubicle
	RCD	300 mA

GETINGE

Technical data

60 KW STEAM GENERATOR

Pressure vessel	Gross volume	52 l
	Water volume	31 l
	Design pressure	3,5 bar
	Shell material	W. Nr. 1.4571
	Shell thickness	4 mm
Capacities	Steam production Safety valve rated for	88 kg/tim. 255 kg/tim.
	Min. feed pump capacity at constant operating pressure:	
	Stainless steel type	2,8 l/min
	Maxi. filling time for feed pump at constant operating press.:	
	Stainless steel type	29 sek
Electrical data	Heating power	60 kW
	Feed pump rating	0,5 kW
Heating elements	Material	SS2378 (254 SMO)
	Power	6 x 10 kW
Level control sensitivity	Float type	--------
	Normal sensitivity	0,25 - 5 kohm
	High sensitivity	5 - 100 kohm
Other data	Noise level	<70 dBA
	Empty weight	110 kg
	Weight, water-filled (includes tank)	165 kg
To be supplied by purchaser	Supply voltage	See apparatus specification
	Group fuse	See rating plate, electrical connection cubicle
	RCD	300 mA

Technical data

25 + 38 KW STEAM GENERATOR

Pressure vessel	Gross volume	2 x 52 l
	Water volume	2 x 31 l
	Design pressure	3,5 bar
	Shell material	W. Nr. 1.4571
	Shell thickness	4 mm
Capacities	Steam production	93 kg/tim.
	Safety valve rated for	255 kg/tim.
	Min. feed pump capacity at constant operating pressure:	
	Stainless steel type	3,0 l/min
	Maxi. filling time for feed pump at constant operating press.:	
	Stainless steel type	65 sek
Electrical data	Heating power	25 + 38 kW
	Feed pump rating	0,5 kW
Heating elements	Material	SS2378 (254 SMO)
	Power	4 x 6,3 kW+ 6 x 6,3 kW
Level control sensitivity	Float type	--------
	Normal sensitivity	0,25 - 5 kohm
	High sensitivity	5 - 100 kohm
Other data	Noise level	<70 dBA
	Empty weight	2 x 110 kg
	Weight, water-filled (includes tank)	2 x 165 kg
To be supplied by purchaser	Supply voltage	See apparatus specification
	Group fuse	See rating plate, electrical connection cubicle
	RCD	300 mA

Technical data

Steam converter

Pressure vessel	Volume		52 litres
	Water volume		31 litres
	Design pressure		3.5 bar
	Jacket material		W. No. 1.4571
	Jacket thickness		4 mm
Capacity	Steam production		75 kg/hour
	safety valve dimensioned for		495[*1] kg/hour
	Minimum capacity of feedwater pump at constant operating pressure:		
		Brass	1.8 l/min.
		Cast iron	2.2 l/min.
		Stainless steel	1.7 l/min
	Maximum filling time for feedwater pump at constant operating pressure:		
		All versions	75 seconds
Electrical data	Rating of feedwater pump		0.37 kW
Level regulator	Float type		--------
Other data	Sound level		<70 dBA
	Weight, empty		110 kg
	Weight, water-filled (tank also)		165 kg
Steam pressure		Primary steam	6 – 7 bar(e)
		Secondary steam	2.8 bar(e)
To be supplied by customer	Connection voltage		See equipment specification
	Circuit fuse		See data plate, electrical connection box

*1. On pipe fracture in a heating coil for primary steam.

SCRAPPING INSTRUCTION

XAX002 . . . . . General

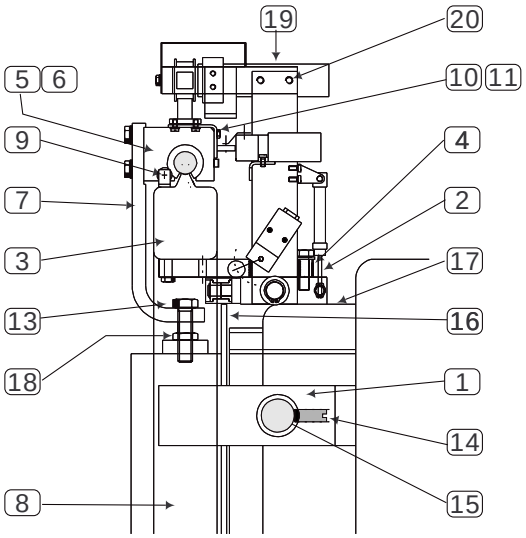
- When taking apart compressed air controlled piston valves, compressed air must be used due to the spring load in the actuator.
- When dismounting doors and chamber care has to be taken due to the weight of the items.

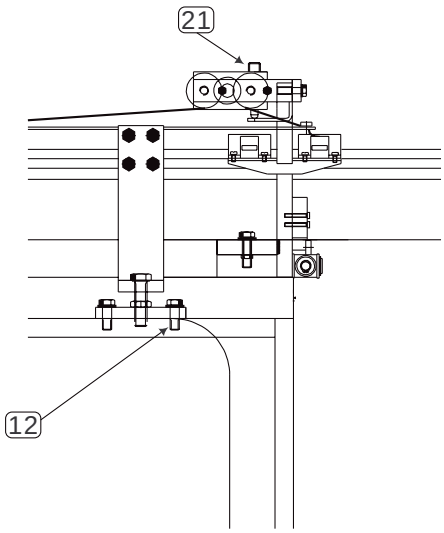
XAV001 . . . . . 66-sterilizers

- Follow the instructions under chapter ”Door” when dismounting the doors.
- When lifting the chamber, use the intended threaded connections on top of the chamber.

XAH001 . . . . . Scrapping of autoclaves with sideways-opening door

- The special lifting eyes on the top of the chamber should be used when lifting the chamber.
- For door disassembly, see the instructions below:





- Loosen the lock nut(18).
- Lower the door until is hangs on the latch hinges (15) by turning the suspension screws (13).
- Unthread the suspension screws.
- Disassemble the lintel unit (3).
- Use the threaded holes for the suspension screws when lifting the door off the hinges.

When dismantling pneumatically-operated piston valves, the actuator must be pressurised with compressed air to compensate for the force from the tensioned closing spring.

When dismantling the door and chamber, bear in mind that the components are very heavy.

When removing the door, the tension in the door suspension spring must be released first, to avoid accidents. See ”Door”.

When lifting, use the tapped connections on the top of the chamber.

CONTROL UNIT PACS 2000

The letters **PACS** stand for **P**rogrammable **A**utoclave **C**ontrol **S**ystem.

The object of the control system is to produce commands and transmit these to the sterilizer executive components to enable for a number of sterilization processes to be accomplished in accordance with a predicted pattern. The command signals are composed by the control unit computer program in combination with measurements of the proceeding process parameters instant values. The latter consist mainly o times, temperatures and pressures.

Various equipment can be connected to the control unit for programming, monitoring and recording the sterilization processes.

The operator communicates with the control unit via a control panel or a standard PC (OPC). The control panel is available in the versions OP1, OP2 and OP3, where OP1 is the smallest type and consists of two door operation keys and eight signal light diodes only.

The OP2- panel has a 102 x 25 mm LCD, six program selector keys, signal lights and up-down and right-left keys to display desired information in preprogrammed windows. Programming can also be made by means of the OP2, but this is limited to numerals only. The OP2 panel is mainly designed for entering operator adjustable parameters.

OP3 being the most advanced type, contains almost all facilities found with any PC, which means that there are, beside the sterilizer control keys and signal lights, a 195 x 105 mm liquid crystal display (LCD), alpha numeric key board and the function keys **F1 - F10**. All these devices allows for any kind of sequential programming to be made by the operator using Boolean algebra. Both OP2 and OP3 may hide certain information behind passwords, thereby making this available to authorized personnel only.

There are connection facilities to PACS 2000 for maximum two OP1 or two OP2 alternatively one of each. Simultaneously with this combination, OP3 and OPC can be connected, but only one of all these can be the commanding unit at a time.

All operating panels are made for monitoring the processes by displaying any set parameter value as well as current values on request. All relevant data associated with a particular process such as batch No., operator No., date, etc. may be entered by the operator using OP3 and OPC.

Documentation of programs, system definitions and process data can be made by connecting a printer to OP3 or OPC. A host computer can also be connected direct to the control unit CPU.

Where the demand arises a measuring and monitoring system, completely independent of the control system, can be arranged by connecting a PACS SUPERVISOR system containing CPU, OP2 and interfaces

to the CPU of the sterilizer control unit. The SUPERVISOR measurements are made by its own separate temperature- and pressure sensors.

The computer contains program for automatic calibration of temperature and pressure transducers. Alternatively correction constants, when known, may be entered manually. Among PACS 2000 test functions there are facilities for activating analog and digital outputs and monitoring analog and digital inputs. With OP3, OPC or OP H, up to 16 service alarms, flagged as display codes, can be programmed, based either upon operation time in hours or number of sterilizing cycles. In both cases the maximum programmable digits are 9999. Service alarms are displayed also by OP2 but this panel will not allow for programming of these.

The hard ware of the sterilizer control system is split up to make the operating panels form small separate units, easy to locate in the most suitable place. The CPU and power pack are placed in separate electrical enclosures, connected to the operating panels through screened leads.

Some terms of the branch

By STERILIZATION means the whole series of treatments to form a process in order to attain total killing of all viable organisms. This is in connection with autoclaves usually made up by air removal, heat treatment and a drying phase.

By STERILIZING means the actual killing part, the heat treatment, of the total process.

Analogous to the two expressions above, STERILIZATION TIME means the durability of the total process from the start until the goods can be unloaded. PROCESS TIME is equal to sterilization time.

STERILIZING TIME represents that part of the process only during which the programmed STERILIZING TEMPERATURE prevails in the chamber.

By PARAMETER in this context means the ELEMENTS WHICH INFLUENCE the sterilization course. Example of parameters in the sterilization process are temperature, pressure, time, gas concentration etc. The PARAMETER VALUES may be fixed in the program or operator adjustable.

F_0-VALUE is a time defined by the equation

$$F_0 = \int_0^t 10^{\frac{T_{(t)} - k_1}{k_2}} \times dt$$

t = Time in minutes

$T(t)$ = Load temperature at time t

k_1 = Constant within the range 0,0 - 150,0 °C. Usually 121,1 °C

k_2 = Constant within the range 0,0 - 99,9 °C. Usually 10,0 °C

The F_0- value is based upon the sterilizing time, required for the temperature prevailing in each moment, being recalculated to the base temperature for steam sterilization, 121.1°C

The use of $_0$-value is most common in the pharmaceutical field, where often the time control of sterilization processes is based upon this value, thereby utilizing the heat applied during heating up and cooling down. By this method, heat sensitive products do not need to be exposed to high temperatures for a longer period of time than required in obtaining a sterile result.

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Various equipment can be connected to the control unit for programming, monitoring and recording the sterilization processes.

The operator communicates with the control unit via a control panel or a standard PC (OPC). The control panel is available in the versions OP1, OP2 and OP-Touch, where OP1 is the smallest type and consists of two door operation keys and eight signal light diodes only.

The OP2- panel has a 102 x 25 mm LCD, six program selector keys, signal lights and up-down and right-left keys to display desired information in preprogrammed windows. Programming can also be made by means of the OP2, but this is limited to numerals only. The OP2 panel is mainly designed for entering operator adjustable parameters.

OP-Touch being the most advanced type, which means that there are, beside the sterilizer control keys and signal lights, a 95 x 72 mm liquid crystal display (LCD) with touch-function. Many functions are selected by pressing their names on the touch screen. All these devices allows for any kind of sequential programming to be made by the operator using Boolean algebra. Both OP2 and OP-Touch may hide certain information behind passwords, thereby making this available to authorized personnel only.

There are connection facilities to PACS 2000 for maximum two OP1 or two OP2 alternatively one of each. Simultaneously with this combination, OP-Touch and OPC can be connected, but only one of all these can be the commanding unit at a time.

All operating panels are made for monitoring the processes by displaying any set parameter value as well as current values on request. All relevant data associated with a particular process such as batch No., operator No., date, etc. may be entered by the operator using OP-Touch and OPC.

Documentation of programs, system definitions and process data can be made by connecting a printer to OP-Touch or OPC. A host computer can also be connected direct to the control unit CPU.

Where the demand arises a measuring and monitoring system, completely independent of the control system, can be arranged by connecting a PACS SUPERVISOR system containing CPU, OP2 and interfaces

to the CPU of the sterilizer control unit. The SUPERVISOR measurements are made by its own separate temperature- and pressure sensors.

The computer contains program for automatic calibration of temperature and pressure transducers. Alternatively correction constants, when known, may be entered manually. Among PACS 2000 test functions there are facilities for activating analog and digital outputs and monitoring analog and digital inputs. With OP-Touch, OPC or OP H, up to 16 service alarms, flagged as display codes, can be programmed, based either upon operation time in hours or number of sterilizing cycles. In both cases the maximum programmable digits are 9999. Service alarms are displayed also by OP2 but this panel will not allow for programming of these.

The hard ware of the sterilizer control system is split up to make the operating panels form small separate units, easy to locate in the most suitable place. The CPU and power pack are placed in separate electrical enclosures, connected to the operating panels through screened leads.

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t = Time in minutes

$T(t)$ = Load temperature at time t

k_1 = Constant within the range 0,0 - 150,0 ^{o}C. Usually 121,1 ^{o}C

k_2 = Constant within the range 0,0 - 99,9 ^{o}C. Usually 10,0 ^{o}C

The F_0- value is based upon the sterilizing time, required for the temperature prevailing in each moment, being recalculated to the base temperature for steam sterilization, 121.1^{o}C

The use of F_0-value is most common in the pharmaceutical field where often the time control of sterilization processes is based upon this value, thereby utilizing the heat applied during heating up and cooling down. By this method, heat sensitive products do not need to be exposed to high temperatures for a longer period of time than required in obtaining a sterile result.

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Various equipment can be connected to the control unit for programming, monitoring and recording the sterilization processes.

The operator communicates with the control unit via a control panel, a combined control panel and PC or via a standard PC. Four versions of the control panel are available: OP 1, OP 2, OP 3 and the basic version of FPC.

OP 1 is the simplest version, consisting of two door operation push-button and eight LEDs for status indication. A maximum of two OP 1 control units can be connected to a single PACS 2000 control system.

The OP2- panel has a 102 x 25 mm LCD, six program selector keys, signal lights and up-down and right-left keys to display desired information in preprogrammed windows. Programming can also be made by means of the OP2, but this is limited to numerals only. The OP2 panel is mainly designed for entering operator adjustable parameters.

The OP 3 panel is an advanced operator's control panel, providing almost all the facilities found with any PC, which means that there are, beside the sterilizer control keys and signal lights, a 195 x 105 mm liquid crystal display (LCD), alpha numeric key board and the function keys F1 - F10. All these devices allows for any kind of sequential programming to be made by the operator using Boolean algebra. Both OP2 and OP3 may hide certain information behind passwords, thereby making this available to authorized personnel only.

The basic version of the FPC is equivalent to the OP 3, except that its LCD display is larger at 195 x 145 mm.

There are connection facilities to PACS 2000 for maximum two OP1 or two OP2 alternatively one of each. Simultaneously with this combination, OP3 and FPC / OPC can be connected, but only one of all these can be the commanding unit at a time.

All operating panels are made for monitoring the processes by displaying any set parameter value as well as current values on request. All relevant data associated with a particular process such as batch No., operator No., date, etc. may be entered by the operator using OP3 and FPC / OPC.

Documentation of programs, system definitions and process data can be made by connecting a printer to OP3 or FPC / OPC. A host computer can also be connected direct to the control unit CPU.

Where the demand arises a measuring and monitoring system, completely independent of the control system, can be arranged by connecting a PACS SUPERVISOR system containing CPU, OP2 and interfaces to the CPU of the sterilizer control unit. The SUPERVISOR measurements are made by its own separate temperature- and pressure sensors.

The computer contains program for automatic calibration of temperature and pressure transducers. Alternatively correction constants, when known, may be entered manually. Among PACS 2000 test functions there are facilities for activating analog and digital outputs and monitoring analog and digital inputs. With OP3, FPC / OPC or OP H, up to 16 service alarms, flagged as display codes, can be programmed, based either upon operation time in hours or number of sterilizing cycles. In both cases the maximum programmable digits are 9999. Service alarms are displayed also by OP2 but this panel will not allow for programming of these.

The hard ware of the sterilizer control system is split up to make the operating panels form small separate units, easy to locate in the most suitable place. The CPU and power pack are placed in separate electrical enclosures, connected to the operating panels through screened leads.

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T(t) = Load temperature at time t

k_1 = Constant within the range 0,0 - 150,0 °C. Usually 121,1 °C

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The use of $_0$-value is most common in the pharmaceutical field, where often the time control of sterilization processes is based upon this value, thereby utilizing the heat applied during heating up and cooling down. By this method, heat sensitive products do not need to be exposed to high temperatures for a longer period of time than required in obtaining a sterile result.

ZSE002 . . . . . OP1 introduction

Operating panel type OP1

Control panel type OP1 is mainly intended for use as a slave panel on ”non control side” of the sterilizer.

Door(s) closed Yellow LED*	indicates that all doors of the sterilizer are closed
Door(s) sealed and locked	indicates that all doors of the sterilizer are secured in closed position against accidental opening.
In progress Yellow LED	indicates that a sterilization process is being automatically performed**.**
Process complete Green LED	indicates that a sterilisation process is completed according to intentions, thereby enabling for the programmed door to be opened.

Process fault Red LED	indicates that the sterilizer has been met by an error.
CLOSE DOOR Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to close the door which is located on the same side as OP1. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that a closing command has been given. With the maintained type, the button should be kept pressed until the door is completely closed which is indicated by the light diode illuminating.
OPEN DOOR Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to open the door which is located on the same side as OP1. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that an opening command has been given. With the maintained type, the button should be kept depressed until the door is completely open which state is indicated by the light diode illuminating.

ZSE033 . . . . . OP1 introduction

Operating panel type OP1

Control panel type OP1 is mainly intended for use as a slave panel on ”non control side” of the sterilizer.

→I I← Yellow LED	indicates that all doors of the sterilizer are closed
→I I←	indicates that all doors of the sterilizer are secured in closed position against accidental opening.
 Yellow LED	indicates that a sterilization process is being automatically performed**.**

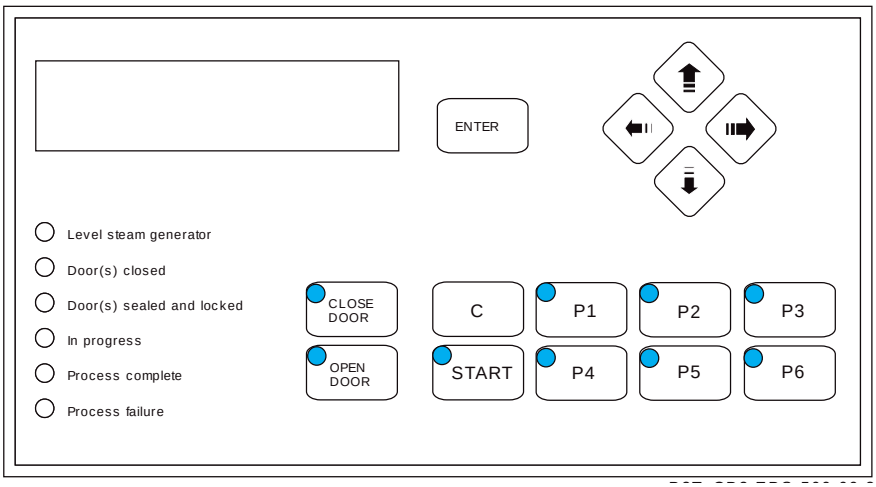
Green LED	indicates that a sterilisation process is completed according to intentions, thereby enabling for the programmed door to be opened.
Red LED	indicates that the sterilizer has been met by an error.
Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to close the door which is located on the same side as OP1. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that a closing command has been given. With the maintained type, the button should be kept pressed until the door is completely closed which is indicated by the light diode illuminating.
Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to open the door which is located on the same side as OP1. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that an opening command has been given. With the maintained type, the button should be kept depressed until the door is completely open which state is indicated by the light diode illuminating.

ZSE003 . . . . . OP2 introduction

Operating panel type OP2

By means of OP2, the operator selects program, alter parameter values, starts and monitors the processes and receives information about possible errors occurring with the sterilizer.

The OP2 control panel will not allow for such programming to be made as making new processes or altering programs already resident in PACS 2000.



Display

The 102 x 25 mm display is the liquid crystal type capable of producing totally 32 alpha-numeric signs in 2 lines.

Push button ENTER

The button is to enter data into the control unit computer.

- Push ENTER to make a cursor point out the first editable position. Move cursor with ←→.
- Change the sign pointed out by the cursor using ↑↓. Digits are changeable 0 - 9, and signs + / -. For digital data 0 = OFF, 1-9 = ON
- Push **ENTER**. The cursor is removed and data entered into PACS 2000.

Arrows

- The four arrows are to scroll up and down, right and left in the menu. The menu tree on page 682 shows the information obtainable when going in different directions in the menu.
  A frame having an arrow pointing downwards from its bottom line keeps several frames hidden behind it. These will be displayed when pushing the down-arrow.
- The right-left arrows also move the cursor so as to point out a specific sign.
- The up-down arrows also increase or decrease a displayed numeric value within 0 and 9 or change between the signs + and -.

Signal lights

Level steam generator	indicates when illuminated that the water content of the associated steam generator is sufficient for its functional ability.
Door(s) closed Yellow LED*	indicates that all doors of the sterilizer are closed
Door(s) sealed and locked	indicates that all doors of the sterilizer are secured in closed position against accidental opening.
In progress Yellow LED	indicates that a sterilization process is being automatically performed**.**
Process complete Green LED	indicates that a sterilisation process is completed according to intentions, thereby enabling for the programmed door to be opened.
Process fault Red LED	indicates that the sterilizer has been met by an error.
CLOSE DOOR Push button with yellow LED. No function on sterilizers with manually operated doors.	The button is to close the door which is located on the same side as OP2. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that a closing command has been given. With the maintained type, the button should be kept pressed until the door is completely closed which is indicated by the light diode illuminating.
OPEN DOOR Push button with yellow LED. No function on sterilizers with manually operated doors.	The button is to open the door which is located on the same side as OP2. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that an opening command has been given. With the maintained type, the button should be kept depressed until the door is completely open which state is indicated by the light diode illuminating.

Push button ”C”

Button **C** is to:

A Confirm that an alarm is apprehended by pushing the C-button, thereby shutting off the audio signal and erasing the display alarm code.

B Manually stepping forward in the process phases in connection with errors and service operations.

Push button START

This is to start an autoclaving process after all start conditions are fulfilled. The latter is indicated by the button indicator LED illuminating.

Push buttons P1 - P6

P1 - P6 are program selector buttons for either of the six first programs resident in the control unit. Programs with higher program numbers i.e. from No. 7 and upwards is selected with ↑. Selected program will be shown by the button indicator LED illuminating, if being among the six first programs in the list, and the display upper line showing number and name of the program. The program sterilizing temperature in C, time in hours:, minutes:, and seconds are shown in the lower line of the display.

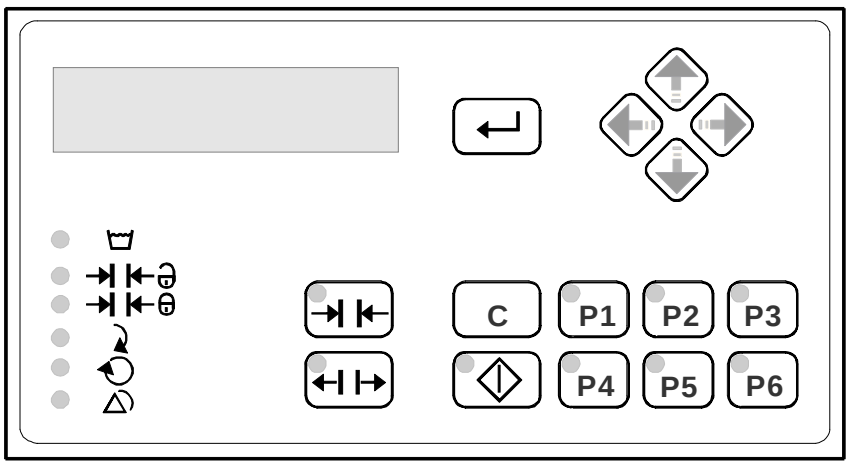
Example

P1 POROUS LOAD	
121 ºC	**00:20:00**

Operating panel type OP2

By means of OP2, the operator selects program, alter parameter values, starts and monitors the processes and receives information about possible errors occurring with the sterilizer.

The OP2 control panel will not allow for such programming to be made as making new processes or altering programs already resident in PACS 2000.



Display

The 102 x 25 mm display is the liquid crystal type capable of producing totally 32 alpha-numeric signs in 2 lines.

Push button ENTER ↵

The button is to enter data into the control unit computer.

- Push ↵ to make a cursor point out the first editable position. Move cursor with ←→.
- Change the sign pointed out by the cursor using ↑↓. Digits are changeable 0 - 9, and signs + / -. For digital data 0 = OFF, 1-9 = ON
- Push ↵. The cursor is removed and data entered into PACS 2000.

Arrows

- The four arrows are to scroll up and down, right and left in the menu. The menu tree on page 686 shows the information obtainable when

going in different directions in the menu.
A frame having an arrow pointing downwards from its bottom line keeps several frames hidden behind it. These will be displayed when pushing the down-arrow.

- The right-left arrows also move the cursor so as to point out a specific sign.
- The up-down arrows also increase or decrease a displayed numeric value within 0 and 9 or change between the signs + and -.

Signal lights

	indicates when illuminated that the water content of the associated steam generator is sufficient for its functional ability.
Yellow LED	indicates that all doors of the sterilizer are closed
	indicates that all doors of the sterilizer are secured in closed position against accidental opening.
Yellow LED	indicates that a sterilization process is being automatically performed**.**
Green LED	indicates that a sterilisation process is completed according to intentions, thereby enabling for the programmed door to be opened.
Red LED	indicates that the sterilizer has been met by an error.
Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to close the door which is located on the same side as OP2. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that a closing command has been given. With the maintained type, the button should be kept pressed until the door is completely closed which is indicated by the light diode illuminating.
Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to open the door which is located on the same side as OP2. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that an opening command has been given. With the maintained type, the button should be kept depressed until the door is completely open which state is indicated by the light diode illuminating.

Push button ”C”

Button **C** is to:

A Confirm that an alarm is apprehended by pushing the C-button, thereby shutting off the audio signal and erasing the display alarm code.

B Manually stepping forward in the process phases in connection with errors and service operations.

Push button START

This is to start an autoclaving process after all start conditions are fulfilled. The latter is indicated by the button indicator LED illuminating.

Push buttons P1 - P6

P1 - P6 are program selector buttons for either of the six first programs resident in the control unit. Programs with higher program numbers i.e. from No. 7 and upwards is selected with ↑. Selected program will be shown by the button indicator LED illuminating, if being among the six first programs in the list, and the display upper line showing number and name of the program. The program sterilizing temperature in C, time in hours:, minutes:, and seconds are shown in the lower line of the display.

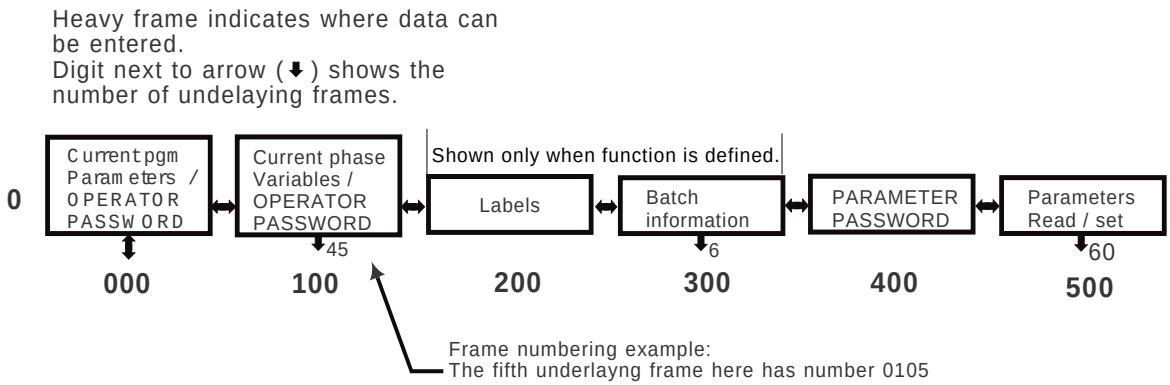
Example

P1 POROUS LOAD	
121 ºC	**00:20:00**

Menu tree OP2

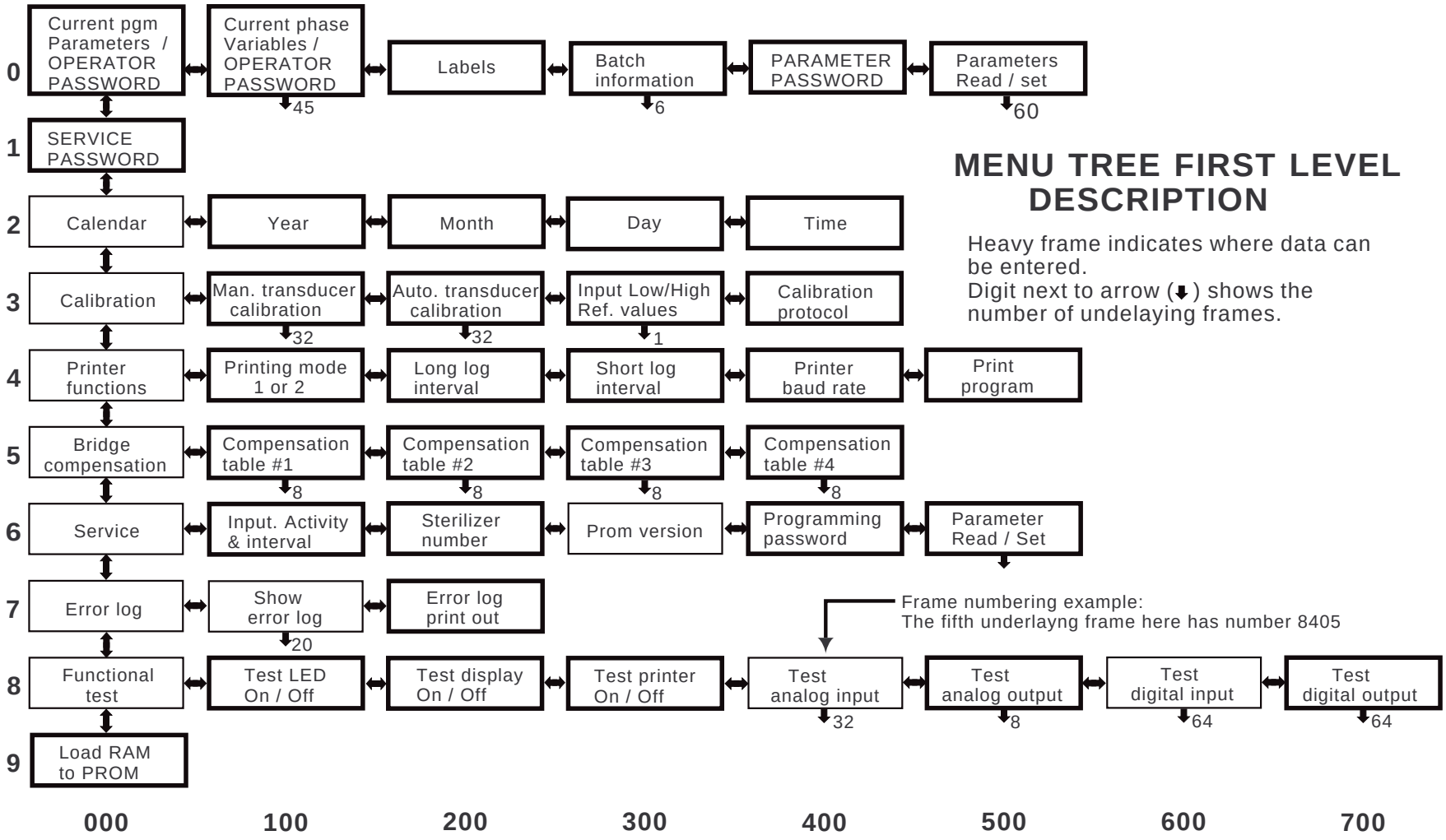
ZSE004 . . . . . OP2 Operator menu tree

ZSE031 . . . . . OP2 Operator menu treeVer. 2.05



ZSE005 . . . . . OP2 Service menu tree

ZSE037 . . . . . OP2 Service menu træ Ver. 2.10



MENU TREE FIRST LEVEL DESCRIPTION

Heavy frame indicates where data can be entered.
Digit next to arrow (⬇) shows the number of undelaying frames.

Passwords

Four passwords exists in the PACS 2000 / OP2 and consists of four digits 0000-9999. The passwords are

- **operator password**
  needed to start restricted processes and to open the door after a process failure
- **parameter password**
  needed to accept change of program parameters
- **service password**
  needed for entering maintenance menus
- **programming password**
  needed for entering programming menus

The parameter password may, as an option, be exchanged to a pass key connected to a digital input. The pass key overrides the parameter password.

Passwords at delivery:
The passwords set in the control system is revealed in a special document delivered in a sealed envelope together with the sterilizer manuals.

Detailed menu tree description

An **E** after the menu No. means that data can be **E**ntered in the appropriate menu.

0000

Basic information

Upper line:	Sequence number and name of activated program.
Lower line:	**Two parameters** (time, temperature, pressure, F_0 etc.) defined in the System configuration menu.

Example:

P3 UNIVERSAL	
135 °C	**00:03:30**

- Change program No. with ↑.

0100

Basic information

Upper line:	**Name** and **No**. of the current phase (part-cycle) of the proceeding process
Lower line:	**Two variables** (time, temperature, pressure, F_0 etc.) defined in the System configuration menu.

Example:

POSTVACUUM	**10**
135 °C	**00:03:30**

Underlaying menus 0101-0145 (45 variables) shows name and value of the, up to 45, variables stored in Process Picture 1.

An undefined variable will create text: NO VARIABLE XX

Upper line:	**Variable name.**
Lower line:	**Variable value**.

Example:

CHAMBER TEMP
135,1 °C

0000 E / 0100 E
(shown only when function is activated)

Process restrictions

Upper line: The text **OPERATOR**

Lower line: The text **PASSWORD**

Appearance of menu 0000 E / 0100 E

OPERATOR	
PASSWORD	**0000**

To enable overriding of process restrictions:

- Push the button **ENTER**. A cursor appears below the left 0.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when the password has been entered.

Menu 0000 / 0100 appears if the entered digits conform with the programmed code No., otherwise menu 0000 E/0100 E is displayed again.

0200 E
(shown only when function is activated)

Upper line: **Number of labels**

Lower line: **00000**

Example:

NUMBER OF LABELS
00000

- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished

0300 E
(shown only when function is activated)

Upper line: **Batch prompt** as defined in Printer Log definition. Six prompts can be shown after each other.

Lower line: **Batch text** to be filled in by the operator.

Example:

OPERATOR
B. Brown

- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished

0400 E

Upper line: The text **PARAMETER**

Lower line: The text **PASSWORD:** and **0000.**

Appearance of menu 0400:

PARAMETER	
PASSWORD	**0000**

To enable stepping to the menus at right:

- Push the button **ENTER**. A cursor appears below the left 0.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when the password has been entered.

Menu 0500 appears if the entered digits conform with the programmed code No., otherwise menu 0400 is displayed again.

The parameter password may, as an option, be exchanged to a pass key. This overrides the parameter pass word.

0500 E

Underlaying menus: 0501-0560 (60 parameters).

Attempt to exceed the list will create text: NO PARAMETER XX.

Upper line: Parameter name

Lower line: **Parameter value**. This can be changed with parameter programmed as ”adjustable”.
A or I indicates the parameter is either **A**djustable or just **I**ndicating

Example:

STERILIZING TEMP	
135 ^{o}C	**A**

To change an adjustable parameter value:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.

Passwords

Four passwords exists in the PACS 2000 / OP2 and consists of four digits 0000-9999. The passwords are

- **operator password**
  needed to start restricted processes and to open the door after a process failure
- **parameter password**
  needed to accept change of program parameters
- **service password**
  needed for entering maintenance menus
- **programming password**
  needed for entering programming menus

The parameter password may, as an option, be exchanged to a pass key connected to a digital input. The pass key overrides the parameter password.

Passwords at delivery:
The passwords set in the control system is revealed in a special document delivered in a sealed envelope together with the sterilizer manuals.

Detailed menu tree description

An **E** after the menu No. means that data can be **E**ntered in the appropriate menu.

0000

Basic information

Upper line:	Sequence number and name of activated program.
Lower line:	**Two parameters** (time, temperature, pressure, F_0 etc.) defined in the System configuration menu.

Example:

P3 UNIVERSAL	
135 °C	**00:03:30**

- Change program No. with ↑.

0100

Basic information

Upper line:	**Name** and **No**. of the current phase (part-cycle) of the proceeding process
Lower line:	**Two variables** (time, temperature, pressure, F_0 etc.) defined in the System configuration menu.

Example:

POSTVACUUM	**10**
135 °C	**00:03:30**

Underlaying menus 0101-0145 (45 variables) shows name and value of the, up to 45, variables stored in Process Picture 1.

An undefined variable will create text: NO VARIABLE XX

Upper line:	**Variable name.**
Lower line:	**Variable value**.

Example:

CHAMBER TEMP
135,1 °C

0000 E / 0100 E
(shown only when function is activated)

Process restrictions

Upper line: The text **OPERATOR**

Lower line: The text **PASSWORD**

Appearance of menu 0000 E / 0100 E

OPERATOR	
PASSWORD	**0000**

To enable overriding of process restrictions:

- Push the button **ENTER**. A cursor appears below the left 0.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when the password has been entered.

Menu 0000 / 0100 appears if the entered digits conform with the programmed code No., otherwise menu 0000 E/0100 E is displayed again.

0200 E
(shown only when function is activated)

Upper line: **Number of labels**

Lower line: **00000**

Example:

NUMBER OF LABELS
00000

- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished

0300 E
(shown only when function is activated)

Upper line: **Batch prompt** as defined in Printer Log definition. Six prompts can be shown after each other.

Lower line: **Batch text** to be filled in by the operator.

Example:

OPERATOR
B. Brown

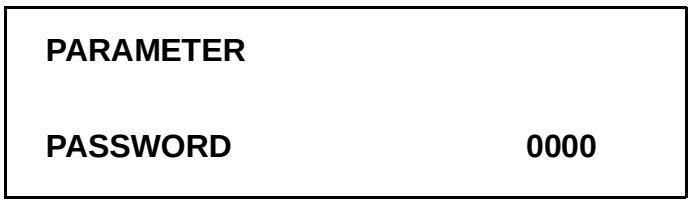
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished

0400 E

Upper line: The text **PARAMETER**

Lower line: The text **PASSWORD:** and **0000.**

Appearance of menu 0400:



To enable stepping to the menus at right:

- Push the button **ENTER**. A cursor appears below the left 0.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when the password has been entered.

If you press ENTER without entering a password or if you enter the wrong password, menu 0500 is displayed and parameters cannot be changed.

The parameter password may, as an option, be exchanged to a pass key. This overrides the parameter pass word.

0500 E

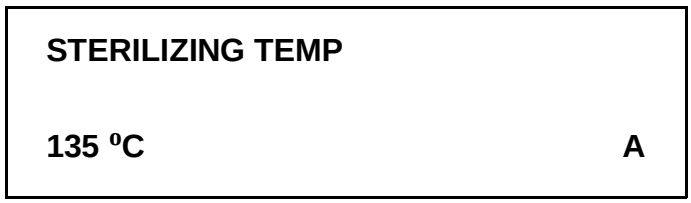
Underlaying menus: 0501-0560 (60 parameters).

Attempt to exceed the list will create text: NO PARAMETER XX.

Upper line: Parameter name

Lower line: **Parameter value**. This can be changed with parameter programmed as ”adjustable”.
A or I indicates the parameter is either **A**djustable or just **I**ndicatin

Example:



To change an adjustable parameter value:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.

1000 E

Upper line:	The text **SERVICE**
Lower line:	The text **PASSWORD:** followed by **0000.**

Appearance of menu 1000:

To enable stepping to the menus below:

- Push the button **ENTER**. A cursor appears below the left 0.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when the password has been entered.

Menu **2000** appears if the entered digits conform with the programmed code No., otherwise menu **1000** is displayed again.

2000

Upper line: The text **CALENDAR** is a seek out heading for the menus to the right.

Lower line: ---

2100 E

Upper line: The text **CALENDAR YEAR**

Lower line: **Current year** using two digits 00-99

Example:

CALENDAR YEAR
93

To change current year setting:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.

2200 E

Upper line: The text **CALENDAR MONTH**

Lower line: **Current month** using two digits 01-12

Example:

CALENDAR MONTH
12

To change current month setting:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑↓.

- Move the cursor with ←→.
- Push **ENTER** when finished.

2300 E

Upper line: The text **CALENDAR DAY**

Lower line: **Current day** using two digits 01-31

Example:

CALENDAR DAY
02

To change current day setting:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.

2400 E

Upper line: The text **CALENDAR TIME**

Lower line: **Current time** using the 24-hour format

Example:

CALENDAR TIME
08:50

To change CALENDAR YEAR setting:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.

3000

Upper line:	The text **CALIBRATION** is a seek out heading for the menus to the right
Lower line:	--

3100 E

Underlaying menus: 3100-3131 (32 transducers)

Upper line:	**Designation** of the **transducer** or the analog input
Lower line:	**Calibration factors** calculated by PACS 2000. Factor **A** ranging between 0.000-9.999. Factor **B** ranging between ±0000-9999 with precision depending on type of input.

Example:

CHAMBER TEMP	
A= 1.000	**B= +000.2**

When known, the calibration factors can be manually set:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.

3200 E

Underlaying menus: 3200-3231 (32 transducers)

Upper line:	**Designation of the transducer** or the analog input
Lower line left:	Current transducer measurement result

Lower line right:	**Selection** of those **transducers** which are to be simultaneously calibrated by setting any digit apart from 0. Setting 0 excludes the transducer from the calibration procedure.

Example:
The chamber temperature transducer is selected to be calibrated and therefore immersed into a calibration bath.

CHAMBER TEMP
A= 134.8 ºC CAL 1

To exclude this transducer from the calibration procedure:

- Push the button **ENTER**. A cursor appears below the digit 1 after the word CAL on the right hand side.
- Change the value to zero with ↓.
- Push **ENTER** when finished.

3300 E

Upper line:	The text **LOW REF** is displayed
Lower line:	The digits **000.0** are displayed while waiting for the low reference temperature to be entered

LOW REF
000.0 ºC

Underlaying menu 3301 (high reference value).

HIGH REF
000.0 ºC

CALIBRATION PROCEDURE
Simultaneously calibrated transducers should all be of the same type, such as RTD Pt100, TC type K etc. Let us in this example assume that a temperature transducer is to be calibrated.

- Specify in menu 3200 the transducers to be calibrated.
- Go to menu 3300.
- Immerse the transducer into an ice bath and measure the temperature.
- Push the button **ENTER**. A cursor appears below the left digit.
- Enter the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.
- Push ↓ to go to menu 3301.
- Immerse the transducer into a hot bath and measure the temperature.
- Push the button **ENTER**. A cursor appears below the left digit.
- Enter the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.

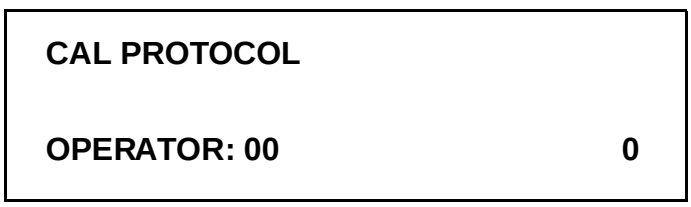
The correction factors A and B are now calculated and stored by the control unit and can from now on be found in the menu 3100.

A print out of the calibration can be activated in menu 3400 next to the right.

3400 E

Upper line:	The text **CAL PROTOCOL**
Lower line:	The text **OPERATOR: 00** and the digit **0**

Example:



To initiate a print out of the calibration results resident in PACS 2000, enter the operator ID-code and change the digit to the right from 0 to 1:

- Push **ENTER**. A cursor appears below the first zero in the operator No.
- Change the value with ↑↓.

- Move the cursor with ←→.
- Set the operator No.
- Set the zero at the right to one
- Push **ENTER** when finished.

4000

The text **PRINTER FUNCTIONS** is a seek out heading for the menus to the right.

4100 E

Upper line: The text **PRINTING MODE**

Lower line: The digit **1** or **2**

Example:

PRINTING MODE
1

Printing mode 1: means that defined parameters of a proceeding process are registered by the printer using letters and digits

Printing mode 2: means that defined parameters of a proceeding process are registered by the printer using not only letters and digits but also one or several graphs

Specifying the parameters and graphs to be printed can only be made by means of a PC or an OP3.

To change printer mode:

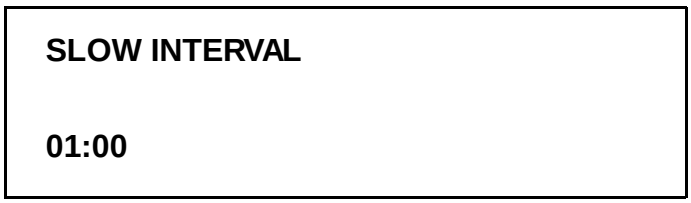
- Push the button **ENTER**. A cursor appears below the lower line digit.
- Push ↑ or ↓ to alter digit between 1 and 2.
- Push **ENTER**.

4200 E

Upper line: The text **SLOW INTERVAL**

Lower line: Time settings in minutes and seconds

Example:



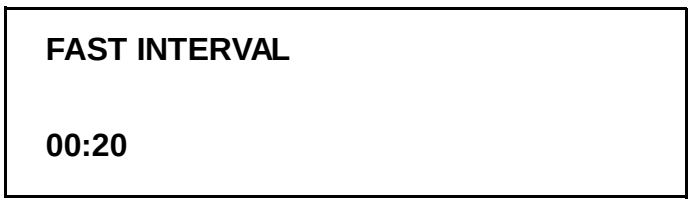
- Push **ENTER**. A cursor appears below the first zero.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished

4300 E

Upper line: The text **FAST INTERVAL**

Lower line: Time settings in minutes and seconds

Example:



- Push **ENTER**. A cursor appears below the first zero.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished

4400E

Upper line: Shows the text **PRINTER BAUD RATE**

Lower line: Shows a selection of baud rates as follows:
12 = 1200 baude

24 = 2400 baude

48 = 4800 baude

96 = 9600 baud

The desired baud rate is entered to the right

Example:

PRINTER BAUDE RATE
(12, 24, 48, 96) : 00

- Push **ENTER**. A cursor appears below the first zero.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push ENTER when finished

4500E

Using this menu an active sterilizer program can be printed.

Upper line: Shows the text **PRINT PROGRAM**

Lower line: Shows **0**

Example:

PRINT PROGRAM
0

- Push **ENTER**. A cursor appears below the zero.
- Change the value to 1 using ↑ to print active program.
- Push **ENTER** when finished

5000

The text **BRIDGE COMPENSATION** is a seek out heading for the menus to the right.

5100-5400 E

Each one of these four menus contain in its eight sub-menus transducer identification and calibration factors for one particular pressure transducer. The factors by-packed each pressure transducer, are based on measurements made by the transducer manufacturer

.

TRANSDUCER ID:
63791

Upper line:	The text	**RB(1-7)**	**GAIN**	**OFFS**
Lower line:	The values	**0000**	**000.00**	**00.0**

RB= A value within the range 2500 - 5000 ohms

GAIN= A value within the range 0 - 327

OFFS= A value within the range -99,9 - +99,9

Example:

RB2	**GAIN**	**OFFS**
3555	**078.06**	**00.0**

To set compensation factors:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑.
- Move the cursor with ←→.
- Proceed accordingly with remaining digits.
- Push **ENTER** when finished.

6000

The text **MAINTENANCE SERVICE LOG** is a seek out heading for the menu to the right.

6100 E

In this stack of maximum 16 menus, the need for periodical maintenance on the sterilizer is programmed. The activity required is shown on the display and can also be drawn attention to by an acoustic signal.

The maintenance intervals can be based on the sterilizer service time (8 pcs) or the number of sterilizing processes completed (8 pcs).

Example of time based maintenance log showing that the weekly service shall be done after 40 hours operation and that it now has been in operation for 16 hours since the last service**.**

WEEKLY SERVICE		
40H	**16**	**RST: 0**

Example of cycle based maintenance log:

REPLACE AIR FILT		
600C	**487**	**RST: 0**

By changing the value after **RST** from 0 to 1 the selected service log will be reset and reached value set to zero.

6200 E

Upper line: Shows the text **STERILIZER NO**

Lower line: Shows **0000**

Example:

STERILIZER NO
0000

- Push **ENTER**. A cursor appears below the first zero.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished

6300

Upper line: Shows the text **PROM VERSION**

Lower line: Shows the word **VER:** and actual version

Example:

PROM VERSION
VER: 2.08

6400 E

Upper line: The text **PROGRAMMING**

Lower line: The text **PASSWORD:** and **0000.**

Appearance of menu 6400:

PROGRAMMING	
PASSWORD	**0000**

To enable stepping to the menus at right:

- Push the button **ENTER**. A cursor appears below the left 0.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when the password has been entered.

Menu 6500 appears if the entered digits conform with the programmed code No., otherwise menu 6400 is displayed again.

6500 E

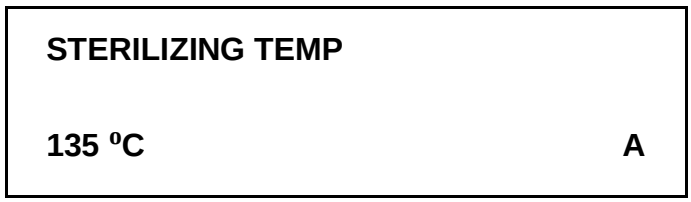
Underlaying menus: 6501-6560 (60 parameters).

Attempt to exceed the list will create text: NO PARAMETER XX.

Upper line: Parameter name

Lower line: **Parameter value**. This can be changed with parameter programmed as ”adjustable” or ”programmable”. A, P or I indicates the parameter is either **A**djustable, **P**rogrammable or just **I**ndicating

Example:



To change an adjustable parameter value:

- Push the button **ENTER**. A cursor appears below the left digit.
- Change the value with ↑↓.
- Move the cursor with ←→.
- Push **ENTER** when finished.

7000

The text **ERROR LOG** is a seek out heading for the menus to the right.

7100

In this stack of maximum 20 menus, each menu contains data about one single error. It means that the last 20 errors which have occurred on the sterilizer are stored here in a rolling memory

Upper line: Error type message

Lower line: **Current program, date** and **time**

Example:

DOOR NOT CLOSED		
P10	**931202**	**10:45**

7200 E

Upper line: Shows the text **ERROR LOGG PRINTOUT**

Lower line: Shows the digit **0.** The error log is printed by changing the value to 1.

Example:

ERROR LOGG PRINTOUT
0

- Push **ENTER**. A cursor appears below the zero.
- Push ↑ to change 0 to 1
- Push **ENTER** when finished

8000

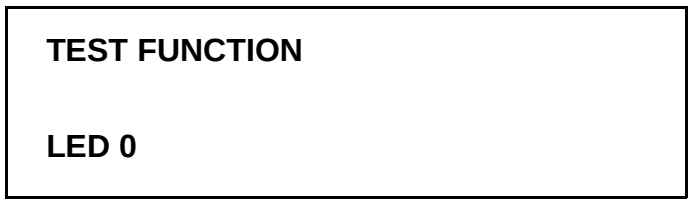
The text **MAINTENANCE TEST FUNCTION** is a seek out heading for the menus to the right.

8100 E

In this menu a global test of all the operating panel LED's takes place when changing the displayed 0 to 1. All LED's start twinkling with 2 Hz for about 5 seconds and the buzzer sounds.

Upper line: The text **TEST FUNCTION**

Lower line: The text **LED 0** which can be changed to **1**



To start a test:

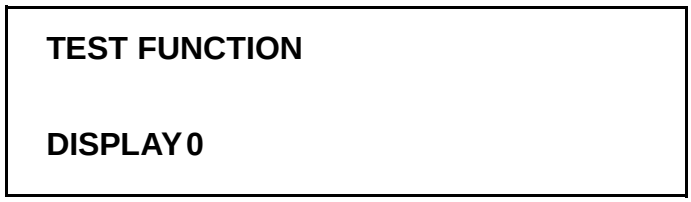
- Push **ENTER**
- Push ↑ to change 0 to 1
- Push **ENTER**

8200 E

In this menu a test of all display segments takes place when changing the displayed 0 to 1. All segments will be activated for about 5 seconds, one line after the other, on changing the displayed 0 to 1.

Upper line: The text **TEST FUNCTION**

Lower line: The text **DISPLAY** and **0**. The latter can be changed to 1



To start the test:

- Push **ENTER**
- Push ↑ to change 0 to 1
- Push **ENTER**

8300 E

In this menu a test of the printer takes place when changing the displayed 0 to 1. All signs of the printer will be printed out in a programmed pattern.

Upper line: The text **TEST FUNCTION**

Lower line: The text **PRINTER** and **0**. The latter can be changed to 1

TEST FUNCTION
PRINTER 0

To start the test:

- Push **ENTER**
- Push ↑ to change 0 to 1
- Push **ENTER**

8400

The text **TEST FUNCTION ANALOG INPUT** is a seek out heading for the up to 32 under-laying menus

8401-8432

Each one of these menus displays the state of one defined analog input.

Upper line: The **Sensor name**

Lower line: **Input No.** (00-31) and **value**. The value is always 4 digits, but precision, sign and unit depends on type of input

CHAMBER TEMP	
AI 00	**134,8 ºC**

8500 E

The text **TEST FUNCTION ANALOG OUTPUT** is a seek out heading for the up to 8 under-laying menus.

The operator is, by setting the mode to MANUAL (1), disabling the built in safety system!
Make sure beyond all doubts that it is safe to set the output to manual mode before doing it.

Each one of these menus displays the state of one defined analog output.

Upper line: The **Output name**

Lower line: **Output No.** (00-07),
mode (0 = automatic, 1 = manual) and
value (0-100%)

Mode and value are changeable

STEAM CHAMBER		
AO 00	**MODE= 0**	**005%**

To set desired output percentage:

- Push **ENTER**
- Change the values with ↑↓.
- Move the cursor with ←→.
- Change MODE from zero to one
- Set the desired output value
- Push **ENTER**

To reset the mode to AUTO

- Move the cursor to the digit 1 to the right of MODE
- Push ↓ to change the value to 0
- Push **ENTER**

Remember to reset the mode to AUTO (0) before leaving the menu.

8600

The text **TEST FUNCTION DIGITAL INPUT** is a seek out heading for the up to 64 under-laying menus.

8601-8664

Each one of these menus displays the state of one defined digital input.

Upper line: The **Sensor name**

Lower line: **Input No.** (00-63) and **state** (ON=1 or OFF=0)

DOOR LOCKED
DI 00 **1**

8700 E

The text **TEST FUNCTION DIGITAL OUTPUT** is a seek out heading for the up to 64 under-laying menus.

8701-8764

The operator is, by setting the mode to MANUAL (1), disabling the built in safety system!
Make sure beyond all doubts that it is safe to set the output to manual mode before doing it.

Each one of these menus displays the state of one defined digital output.

Upper line: The **Output name**

Lower line: **Output No.** (00-63), **mode** (0=automatic, 1= manual) and **state** (0 = OFF, 1 = ON)

Mode and state are changeable

LOCK DOOR		
DO 00	MODE= 0	1

To set desired output state

- Push **ENTER**
- Change the value with ↑↓
- Move the cursor with ←→
- Change MODE to 1
- Set the status digit according to wish
- Push **ENTER** when finished

To reset the mode to AUTO

- Move the cursor to the digit 1 to the right of MODE
- Push ↓ to change the value to 0
- Push **ENTER**

Remember to reset the mode to AUTO (0) before leaving the menu.

9000 E

Using this menu an installed specific sterilizer program can be transferred to a FLASH if supplied.

Please note that the FLASH is optional and normally not installed in the control system.

Upper line: The text **LOAD RAM TO PROM**

Lower line: The digit 0 which can be altered to 1

LOAD RAM TO PROM
0

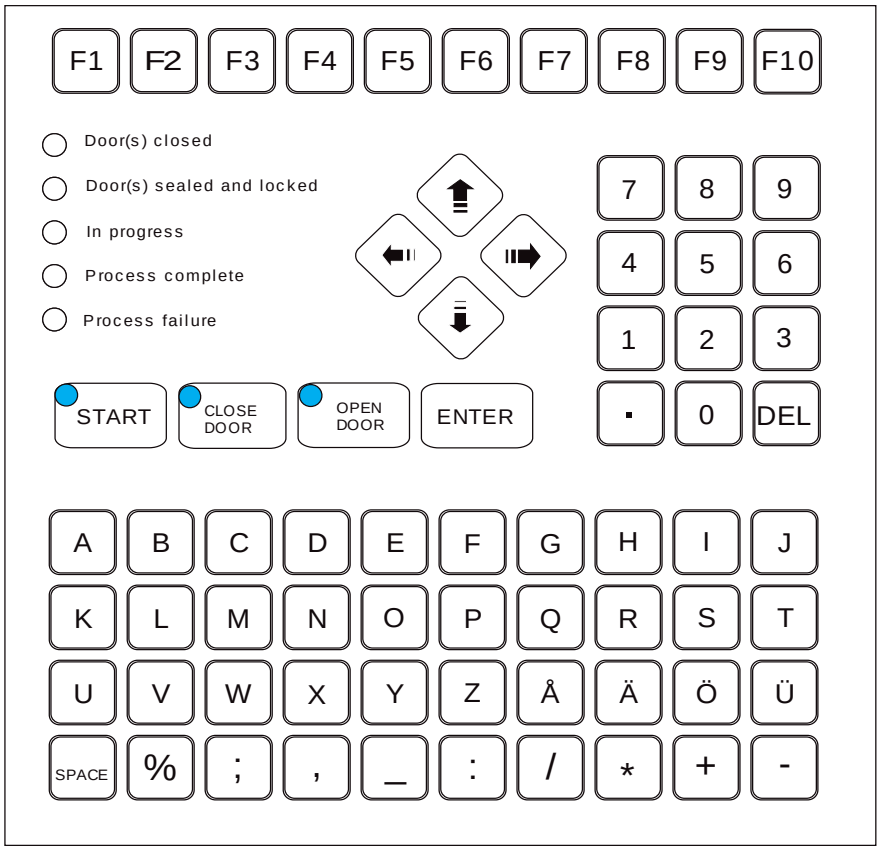
To execute a transfer:

- Push **ENTER**
- Push ↑ once to change 0 to 1
- Push **ENTER**. The text LOADING appears on the lower line.

Operating panel type OP3

OP3 is an PC-XT compatible operator panel which is mainly intended for such programming as altering programs already resident in PACS 2000, entering parameter values in the resident programs where appropriate and starting and monitoring sterilization processes.

New programs may be developed by means of OP3 but an ordinary PC is more suitable for this purpose.
OP3 has no hard disk but a floppy drive can be installed on specia demand.



P2T_OP3.EPS 560 60 41

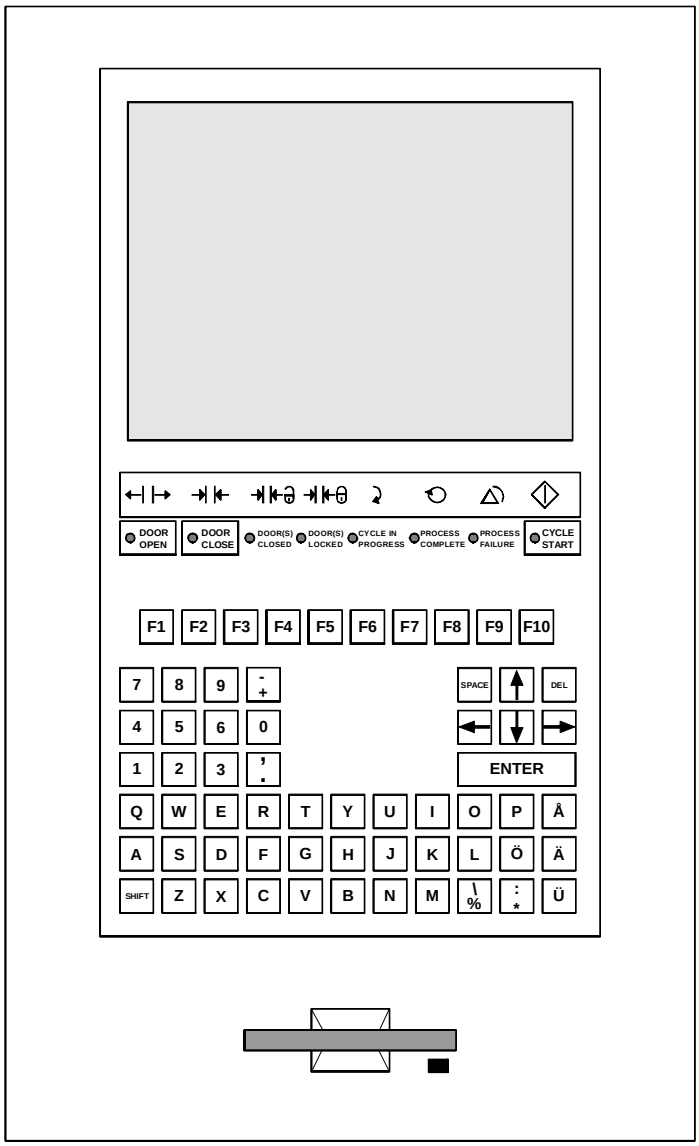
Display

The display of the graphic LCD type is 195 x 105 mm. It produces 640 dots horizontal and 200 dots vertical.

Operator's panel, FPC

The FPC control unit is an IBM©-compatible operator's panel, intended primarily for programming such as modifying programs already resident in PACS 2000, entering parameter values in the resident programs where necessary and starting and monitoring sterilization processes.

New programs can be composed via the FPC, but an ordinary PC is more suitable for the purpose.



Display

The display is of the graphic LCD type, 195 x 145 mm in size.

ZSE040 . . . . . FPC with diskette/hard disk

The FPC provides storage capacity on a hard disk and diskettes. The menu structure is identical with that of the OP 3, with the addition of menus for transferring data/process logs to diskettes or the hard disk. It communicates with PACS 2000 via a standard RS232 serial interface connected to COM1. COM2, if fitted, can be used to connect a printer or a PROM programmer. In the LOCAL mode, programs can be run without a PACS 2000 being connected.

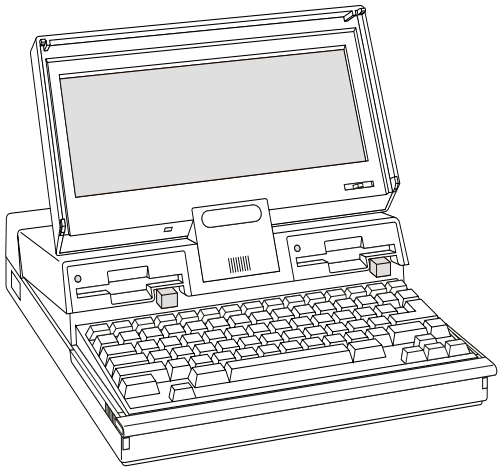
ZSE041 . . . . . FPC with OPH program

The FPC is loaded with OPH software, enabling it to communicate with the Supervisor via COM1. Its communication facilities use the same system as for the OPH for connection of several sterilizers, i.e. the PACS 2000 and Supervisor have different numerical identities, and can therefore be addressed individually. In its standard version, the PACS 2000's identity number is 01 and the SUPERVISOR's is 51.

The menu description section assumes that an OPH is connected in this way. Using the same software, these connection alternatives are also available with FPC.

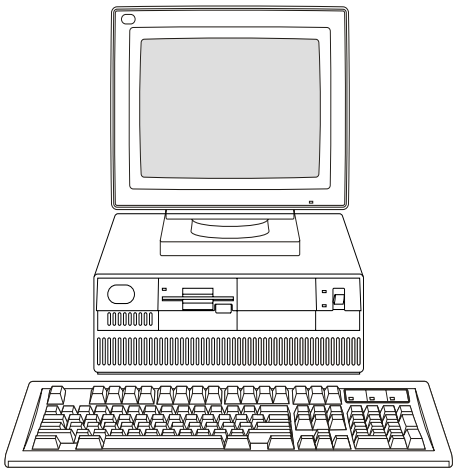
ZSE009 . . . . . OPC / OPH introduction

OPC



OPC is a standard IBM compatible PC with DOS and with backup utilities on hard disk and floppy. OPC is intended to be used for program development. The menu tree is identical to OP 3 but OPC also includes menus for loading data on diskette or hard disk. OPC communicates with the PACS 2000 via a standard RS232 serial interface connected as COM1. COM2, if installed, may be used for connecting a printer or a PROM programmer. In Local mode it is possible to run the program without any PACS connected.

OP H

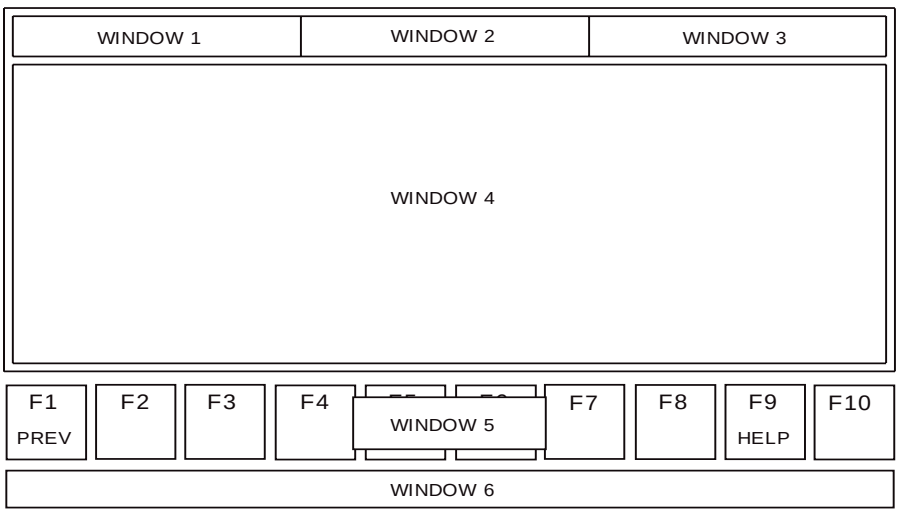


OP H is identical to OPC with the extension that it can be connected to a network including more than one PACS. OP H communicates with the PACS 2000 via a standard RS485 serial interface. OP H is communicating with one PACS at a time.

ZSE010 . . . . . OP3 / OPC / OPH general

Screen lay-out

The screen is divided into six windows, each one displaying different kind of information.



Window 1	shows system date and time shows connected sterilizer name and number on OP H
Window 2	shows sequence number and symbolic name for the active PACS program in on-line mode and program version number in local mode

Window 3	shows symbolic name and sub-phase number for the active PACS phase in on-line mode. Shows the text ”LOCAL MODE” when in that mode.
Window 4	shows all menu functions in the menu tree. Active menu headline is displayed in the upper right corner of the window.
Window 5	describes the active function of the keys **F1-F10**
Window 6	shows menu handling messages for all menus except process pictures. In process pictures the left part of the window is used for PACS error texts and the right part for PACS information texts

Function keys F1-F10

The function of these keys are depending on the menu selected in the menu tree and will be shown in fully written out text in a window on the display close to the appropriate key.

Key board

The alpha numeric keys are equal to those found with any ordinary PC-key board.

Signal lights

Door(s) closed Yellow LED	indicates that all doors of the sterilizer are secured
Door(s) sealed and locked Yellow LED	indicates that all doors of the sterilizer are secured in closed position against accidental opening
In progress Yellow LED	indicates that a sterilization process is being automatically performed
Process complete Green LED	indicates that a sterilization process is completed according to intentions, thereby enabling for the programmed door to be opened
Process fault Red LED	indicates that the sterilizer has been met by an error.

Push buttons

START	The button is to start an autoclaving process after all start conditions are fulfilled. The latter is indicated by the button indicator LED illuminating.
CLOSE DOOR Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to close that door which is located on the same side as the button. The button may, depending on the programming, be of the impulse or maintained type.With the impulse type, the light diode indicates that a closing command has been given.With the maintained type, the button should be kept depressed until the door is completely closed which state is indicated by the light diode illuminating.
OPEN DOOR Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to open that door which is located on the same side as the button. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that an opening command has been given. With the maintained type, the button should be kept depressed until the door is completely open which state is indicated by the light diode illuminating.
ENTER	The button has the same function as the enter-key on any ordinary PC.

Arrows

The four arrows are to scroll up and down, right and left in the menu.

ZSE042 . . . . . FPC Introduction

Key board

The alpha numeric keys are equal to those found with any ordinary PC-key board.

Signal lights

	Door(s) closed Yellow LED	indicates that all doors of the sterilizer are closed
	Door(s) sealed and locked Yellow LED	indicates that all doors of the sterilizer are secured in closed position against accidental opening
	In progress Yellow LED	indicates that a sterilization process is being automatically performed
	Process complete Green LED	indicates that a sterilization process is completed according to intentions, thereby enabling for the programmed door to be opened
	Process fault Red LED	indicates that the sterilizer has been met by an error.

Push buttons

	START	The button is to start an autoclaving process after all start conditions are fulfilled. The latter is indicated by the button indicator LED illuminating.
	CLOSE DOOR Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to close that door which is located on the same side as the button. The button may, depending on the programming, be of the impulse or maintained type.With the impulse type, the light diode indicates that a closing command has been given.With the maintained type, the button should be kept depressed until the door is completely closed which state is indicated by the light diode illuminating.

←I I→	**OPEN DOOR** Push button with yellow LED No function on sterilizers with manually operated doors.	The button is to open that door which is located on the same side as the button. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that an opening command has been given. With the maintained type, the button should be kept depressed until the door is completely open which state is indicated by the light diode illuminating.
↵	**ENTER**	The button has the same function as the enter-key on any ordinary PC.

Arrows

The four arrows are to scroll up and down, right and left in the menu.

ZSE012 . . . . . OPC / OPH general

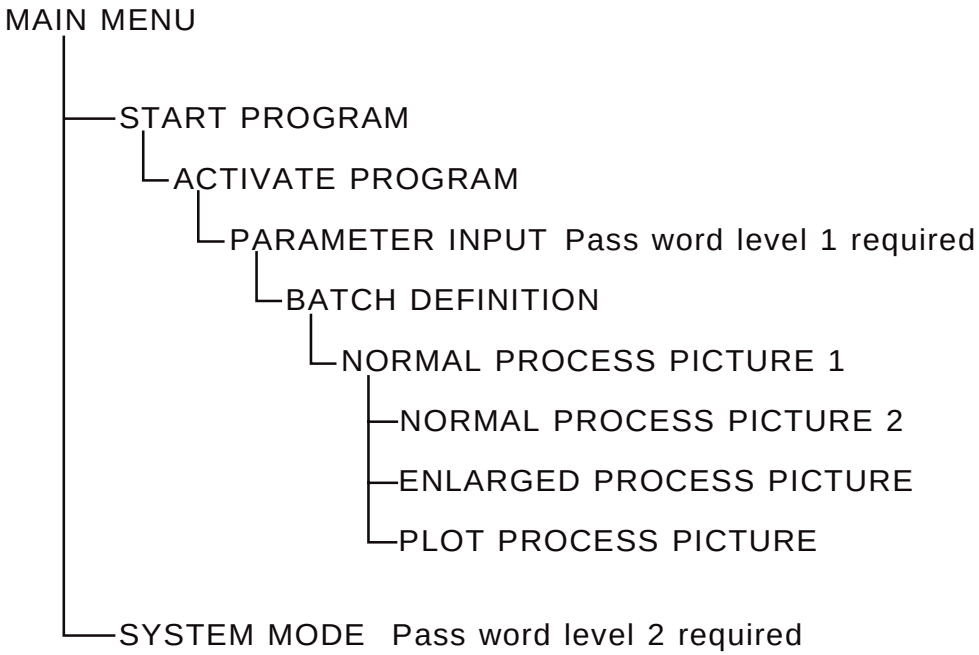
On line / Local mode

OP can operate in two modes, ONLINE mode and LOCAL mode. In On-line mode the communication link between OP and PACS is activated and the databases in the two units contain identical data. In local mode OP works remotely without any communication with PACS.

Local modes are available in version OPH and OPC, while OP3 always requires on line mode

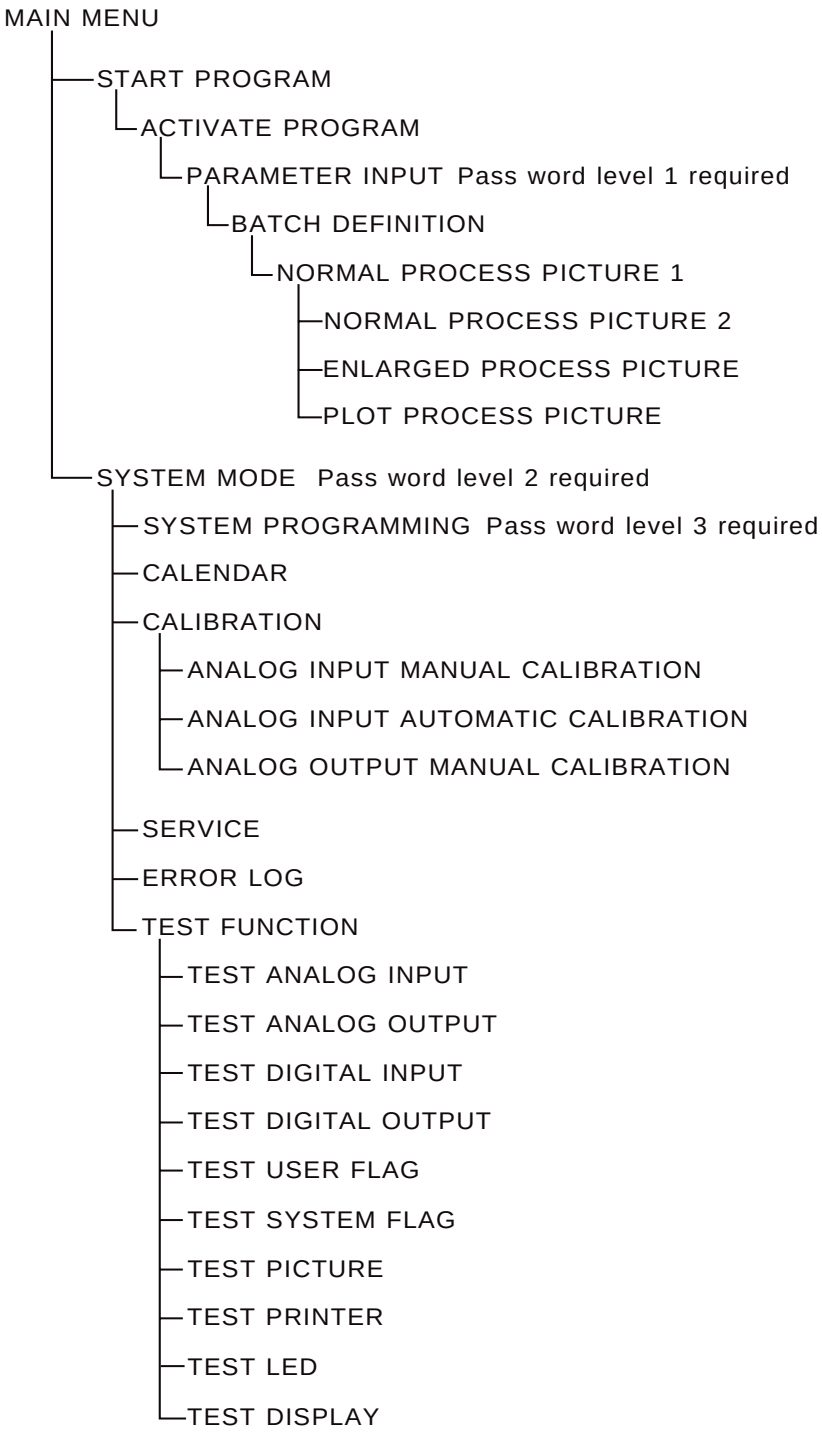
The OP3 menu tree

Below follows that part of the menu tree which is of use for the operator.



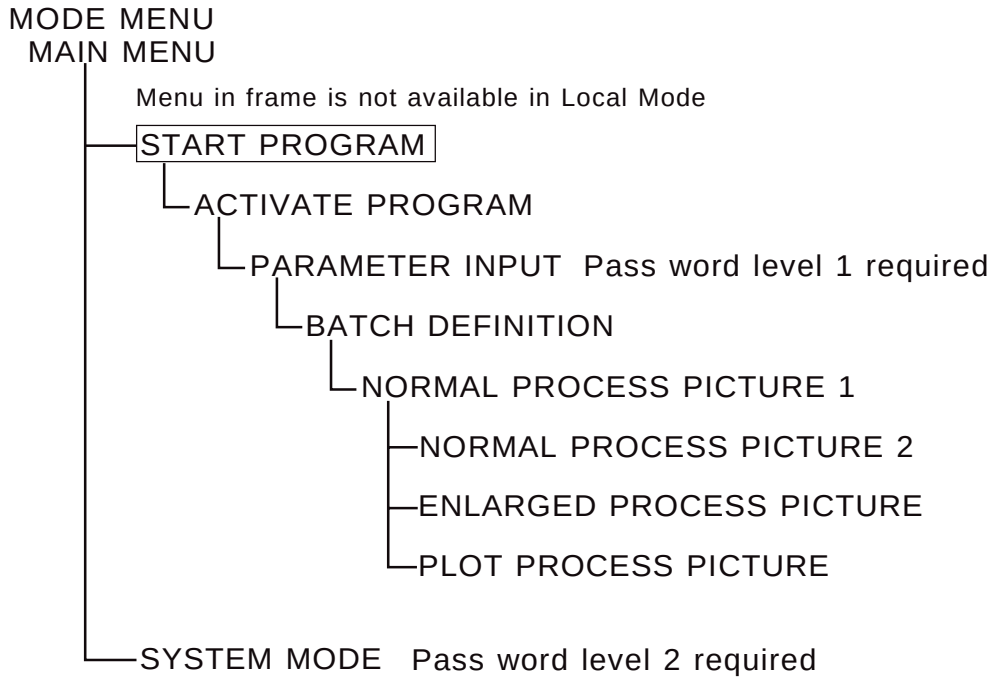
The OP3 menu tree

Below follows that part of the menu tree which is of use for the service man.



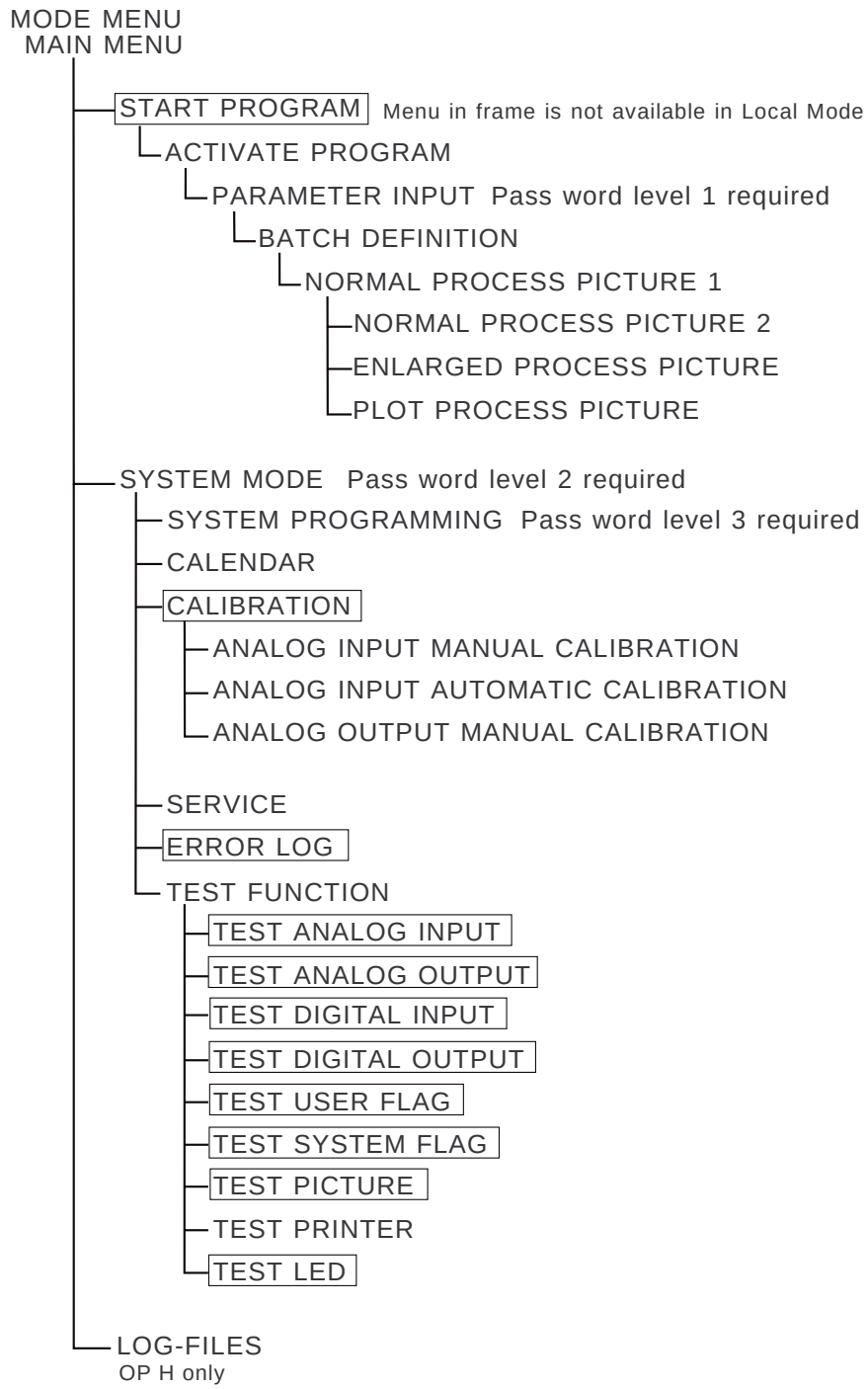
The OPC / OPH menu tree

Below follows that part of the menu tree which is of use for the operator.



The OPC / OPH menu tree

Below follows that part of the menu tree which is of use for the service man.



Passwords

Four passwords exists in the PACS 2000 and consists of four digit 0000-9999. The passwords are

- operator password
  needed to start restricted processes and to open doors after a process failure
- parameter password
  needed to accept change of program parameters
- service password
  needed for entering maintenance menus
- program password
  needed for entering programming menus

The parameter password may, as an option, be exchanged to a pass key connected to a digital input. The pass key overrides the parameter password.

Passwords at delivery:
The passwords set in the control system is revealed in a special document delivered in a sealed envelope together with the sterilizer manuals.

Menu descriptions

ZSE043 . . . . . OP 3/FPC/OPC/OPH. Hospital, general

Passwords

Four passwords exists in the PACS 2000 and consists of four digit 0000-9999. The passwords are

- **operator password**
  needed to start restricted processes and to open doors after a process failure
- **parameter password**
  needed to accept change of program parameters
- **service password**
  needed for entering maintenance menus
- **program password**
  needed for entering programming menus

The parameter password may, as an option, be exchanged to a pass key connected to a digital input. The pass key overrides the parameter password.

Passwords at delivery:
The passwords set in the control system is revealed in a special document delivered in a sealed envelope together with the sterilizer manuals.

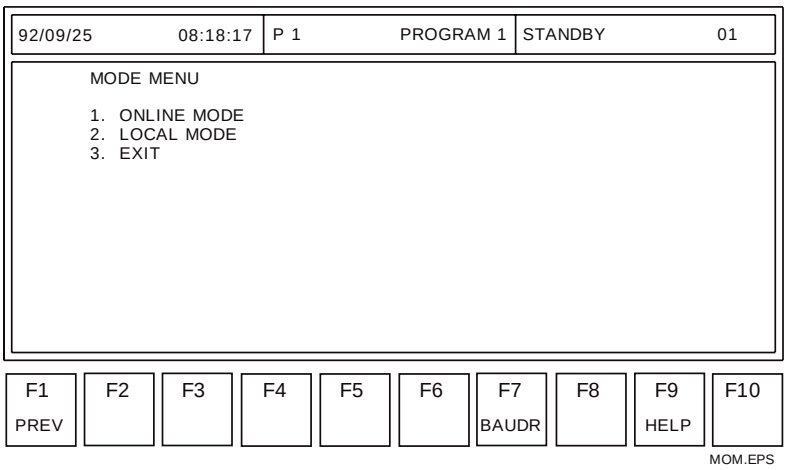
Menu descriptions

ZSE035 . . . . . OPC / OPH mode menu.Ver 2.10

Mode menu

This is the first menu shown after power-up. Here the operator can choose which mode the OP should work in.
ON-LINE MODE for connection with PACS 2000 or
LOCAL MODE for stand alone operation.

Alternative 3 in the menu terminates the program and returns to DOS. Parameter code is required to use this alternative.



An alternative is highlighted with ↑ ↓ and selected with **ENTER**. A alternative can also be highlighted by pressing the number of the desired alternative.

Before ON-LINE MODE is activated PACS 2000 communication baud rate can be altered. **F7** shows a window were the operator can choose between the alternatives 1200, 2400, 4800 and 9600 via a choice list. Default value is 9600 baud.

Valid only for OP H: If ON-LINE MODE is chosen a window is shown where the operator can specify which sterilizer he like to be connected to. Allowed values are: 1 - 99.

ON-LINE / LOCAL MODE
OP can operate in two modes, ON-LINE MODE and LOCAL MODE. In ON-LINE MODE the communication link between OP and PACS 2000 is activated and the data bases in the two units contains identical data. In LOCAL MODE OP works without any communication to PACS.

LOCAL MODE is available on version OP H and OPC while OP 3 always requires ON-LINE MODE.

Following menu functions are not available in LOCAL MODE:

- START PROGRAM and all underlying menus.
- CALIBRATION MENU and all underlying menus.
- ERROR LOGG
- TEST ANALOG INPUT
- TEST ANALOG OUTPUT
- TEST DIGITAL INPUT
- TEST DIGITAL OUTPUT
- TEST USER FLAG
- TEST SYSTEM FLAG
- TEST PICTURE
- TEST LED

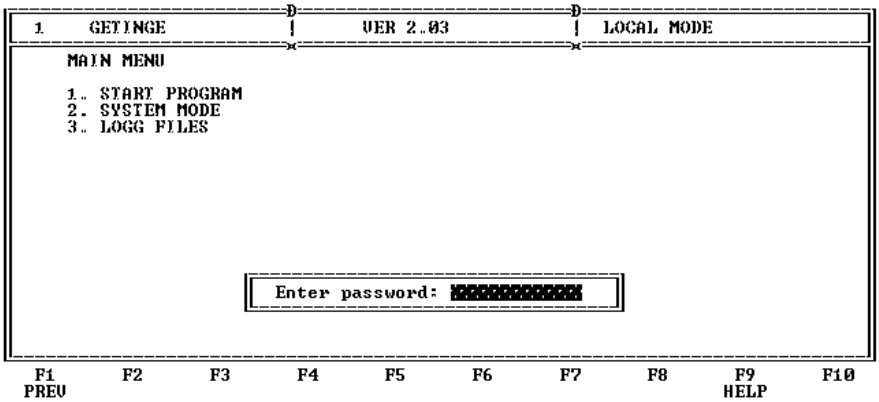
Function keys:
F1 PREV - Previous menu

F7 BAUDR - Activate PACS 2000 baud rate window

F9 HELP - Help text

Main menu

Select either START PROGRAM, SYSTEM MODE or LOG FILES by highlighting the desired text using ↑↓ or typing the leading number, then push **ENTER**.



Activation of SYSTEM MODE or LOFG FILE requires a password with level 2 (service password) or higher. Non accepted password results in a message in window 6.

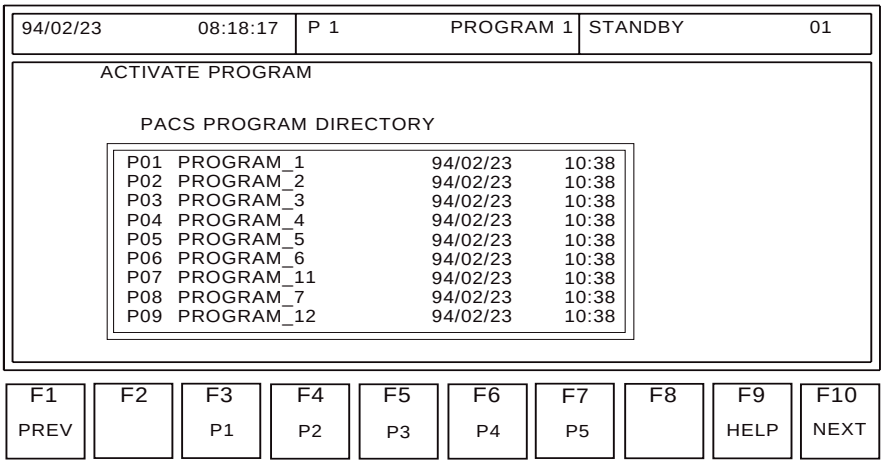
NOTE!
Item 3 LOG FILES on the menu is only available with OP H.

F1 PREV - Previous menu

F9 HELP - Help text

Activate program

Activate desired program, from the scrollable list.



Highlight desired program using ↑↓ and confirm selection with **ENTER**.
The first five programs in the list may also be activated by pushing **F3-F7**.

Activation of a program is automatically followed by PARAMETER INPUT menu.

Function keys:
F1 PREV - Previous menu

F3-F7 P1 - P5 - Activate first five programs in list

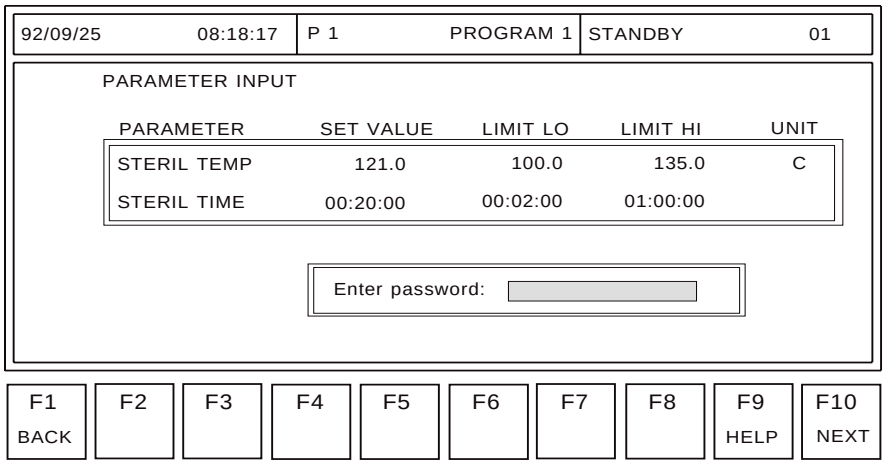
F9 HELP - Help text

F10 NEXT - Go to PARAMETER INPUT menu without activating any new program.

Parameter input

This menu will not be shown if the selected program does not contain any adjustable parameter.

With PACS in stand by mode only, this menu allows for the operator to change adjustable parameters for the previously selected program.



The parameter password must be entered to enable for any parameter to be changed. If password input is disabled with **F1**, the parameter list can only be scrolled through but no parameters can be changed.

If KEY password mode is enabled, the password window never occurs on screen. The status of the specified key input then decides whether the parameters are allowed to be changed or just displayed.

Parameter inputs are checked against the high and low limits shown on screen. Inputs beyond limits are met with a message in Window 6.

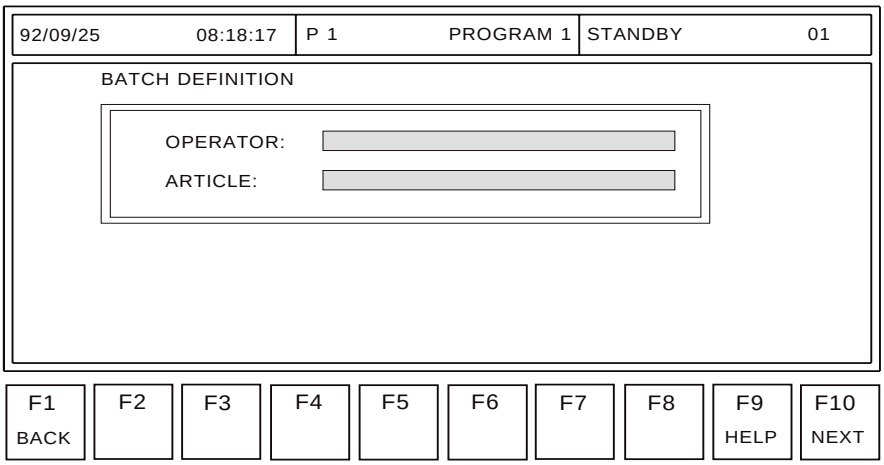
Function keys:
F1 BACK - Go to ACTIVATE PROGRAM menu.

F9 HELP - Help text.

F10 NEXT - Go to BATCH DEFINITION menu.

Batch definition

Data in this menu are part of the information found in the printer log and should be entered prior to start of a process with PACS in stand by mode.



Each input contains maximum 16 characters. Only batch fields having field prompts defined are shown in this menu. The batch field prompts, maximum 6 pcs, are defined in the PRINTER LOG DEFINITION.

If the definition prescribes field entry as a requirement, the field can not be left without any character entered.

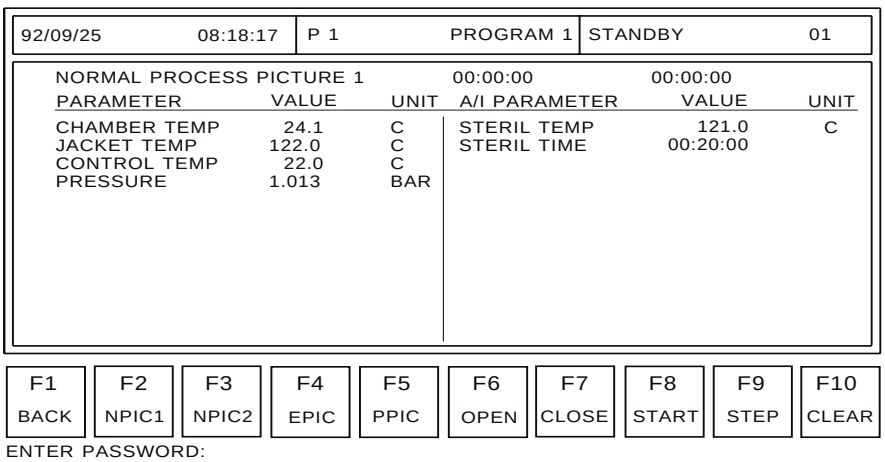
Function keys:
F1 BACK - Go to ACTIVATE PROGRAM menu.

F9 HELP - Help text.

F10 NEXT - Go to NORMAL PROCESS PIC.1 menu.

Normal process picture 1

This menu continuously displays PACS data on screen. No data entry possible.



Active process time and phase time are shown on the same line as the heading.

The left column shows the current values of the continuing process parameters. These are parameters defined in the 15 first entries of NORMAL PROCESS PICTURE DEFINITION.

The right column shows the set values of the continuing process 15 first A and I parameters. These will not be updated.

PACS error text is shown on the first half of line 25 and information text on remaining half.
Operator password will be prompted for on this line after a process failure.

Function keys:
F1 BACK - Go to ACTIVATE PROGRAM menu.

F2 NPIC1 - No function in this menu.

F3 NPIC2 - Go to NORMAL PROCESS PICTURE 2.

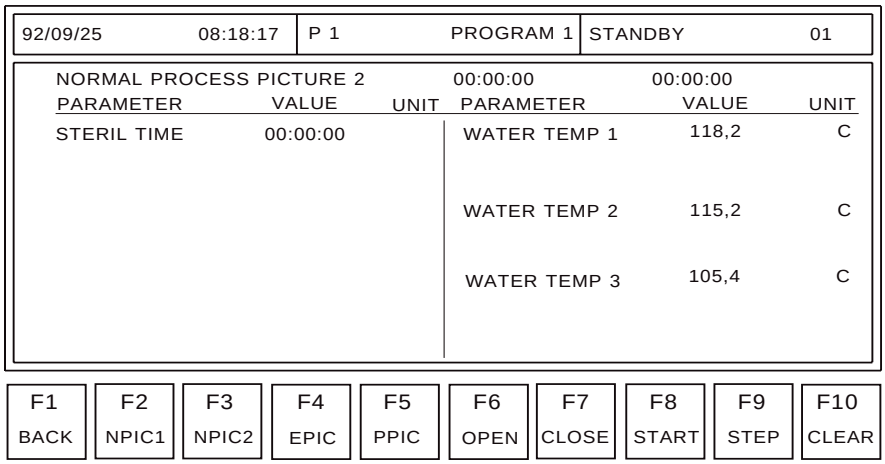
F4 EPIC - Go to ENLARGED PROCESS PICTURE.

F5 PPIC - Go to PLOT PROCESS PICTURE.

F6-F10 Name and function defined by PACS program.

Normal process picture 2

This menu continuously displays PACS data on screen. No data entry possible.



Active process time and phase time are shown on the same line as the heading.

The left column shows the current values of the continuing process parameters. These are parameters defined in the 16 - 30 first entries of NORMAL PROCESS PICTURE DEFINITION.

The right column shows the current values of the continuing process parameters. These are parameters defined in the 31 - 45 first entries of NORMAL PROCESS PICTURE DEFINITION.

PACS error text is shown on the first half of line 25 and information text on the remaining half.

Function keys:
F1 BACK - Go to ACTIVATE PROGRAM menu.

F2 NPIC1 - Go to NORMAL PROCESS PICTURE 1.

F3 NPIC2 - No function in this menu.

F4 EPIC - Go to ENLARGED PROCESS PICTURE.

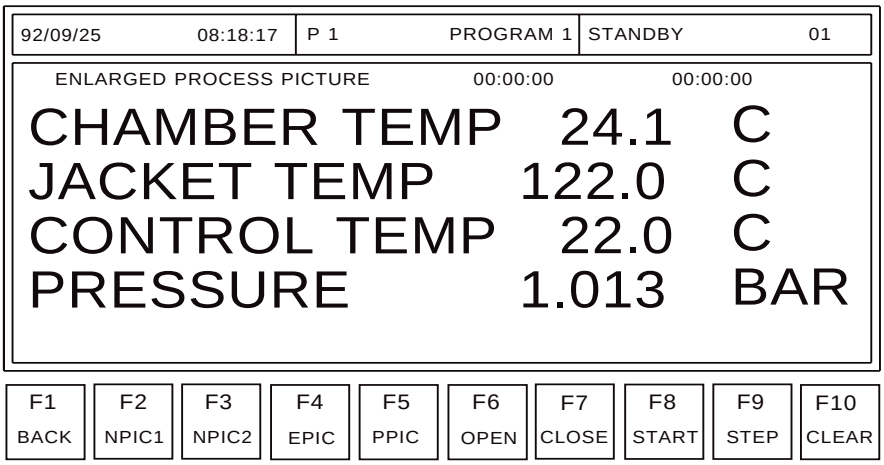
F5 PPIC - Go to PLOT PROCESS PICTURE.

F6-F10 Name and function defined by PACS program.

Enlarged picture

This menu continuously displays PACS data on screen. No data entry possible.

Data is displayed with enlarged characters in order to facilitate distant readings.



Active process time and phase time are shown on the same line as the heading.

Maximum 4 parameters can be shown in this menu. Actual parameters are defined in ENLARGED PROCESS PICTURE DEFINITION.

PACS error text is shown on the first half of line 25 and information text on remaining half.

Function keys:
F1 BACK - Go to ACTIVATE PROGRAM menu.

F2 NPIC1 - Go to NORMAL PROCESS PICTURE 1.

F3 NPIC2 - Go to NORMAL PROCESS PICTURE 2.

F4 EPIC - No function in this menu.

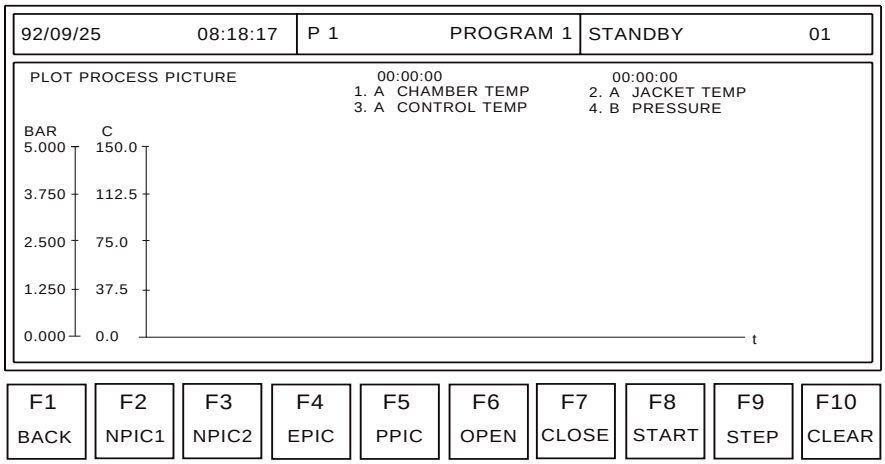
F5 PPIC - Go to PLOT PROCESS PICTURE.

F6-F10 Name and function defined by PACS program.

Plot process picture

This menu plots real time signals in a diagram on the screen.

Signal names and corresponding Y-axis are listed above the plot.



Active process- and phase times are shown on the same line as the header.

Maximum 2 Y-axis and 6 signals can be displayed. Signals and Y-axis are defined in the menu PLOT PROCESS PICTURE DEFINITION.

PACS error text is shown on the first half of line 25 and information text on remaining half.

The length of the X-axis will become automatically adapted to the duration of the active process.

Function keys:
F1 BACK - Go to ACTIVATE PROGRAM menu.

F2 NPIC1 - Go to NORMAL PROCESS PICTURE 1.

F3 NPIC2 - Go to NORMAL PROCESS PICTURE 2.

F4 EPIC - Go to ENLARGED PROCESS PICTURE.

F5 PPIC - No function in this menu.

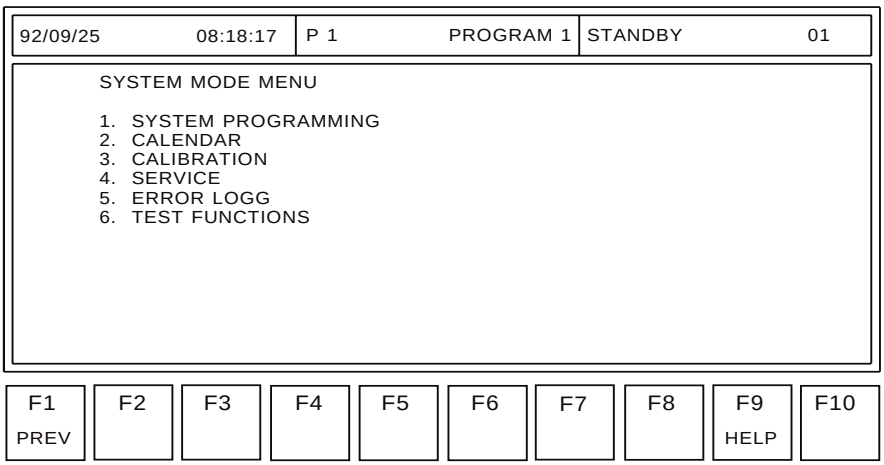
F6-F10 Name and function defined by PACS program.

ZSE020 . . . . . OP3 / OPC / OPH service menus

System mode menu

Highlight desired alternative using ↑↓ down or leading number then push **ENTER**.

Activation of SYSTEM PROGRAMMING requires entering a passwords with level 4.

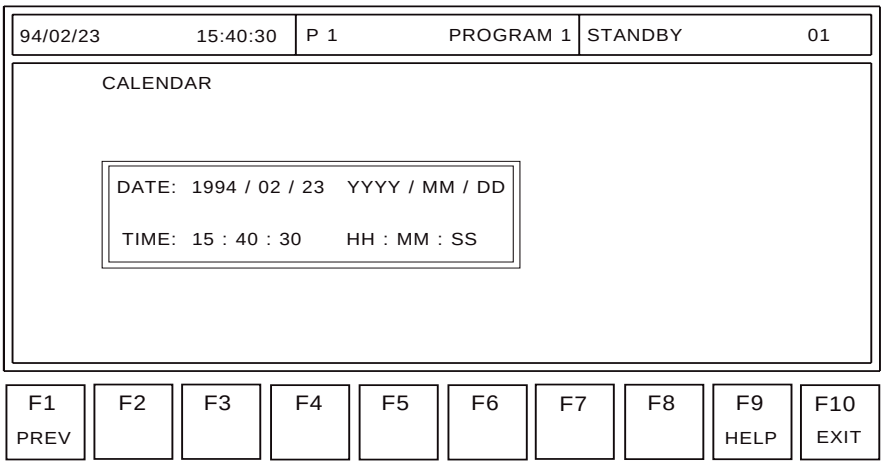


Function keys:
F1 PREV - Previous menu.

F9 HELP- Help text.

Calendar

Changing date and system time is made in this menu.



The format of date depends on the way it is specified in the SYSTEM CONFIGURATION menu.

Possible formats are:

SW - yy/mm/dd

US - mm/dd/yy

EU - dd/mm/yy

Ranges for time field are 00:00:00 - 23:59:59

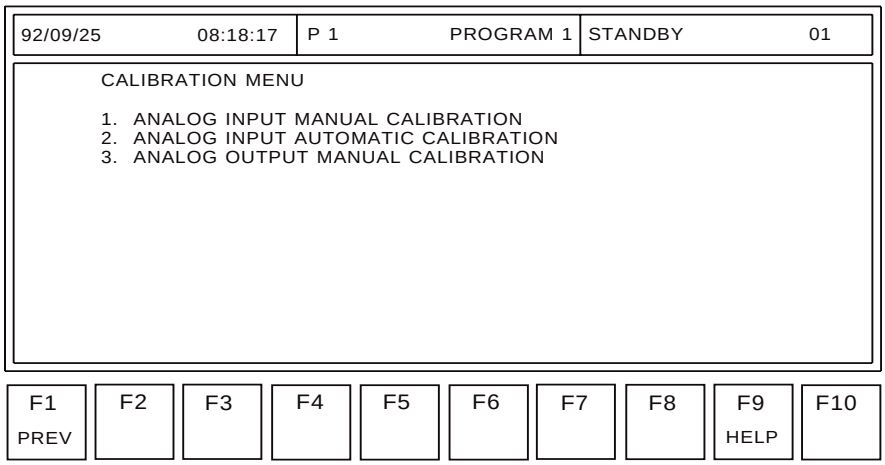
Function keys:
F1 PREV - Abort menu and cancel setting

F9 HELP- Help text.

F10 EXIT - Exit menu and activate setting

Calibration menus

Highlight desired alternative using ↑↓ or leading number and then push **ENTER**.

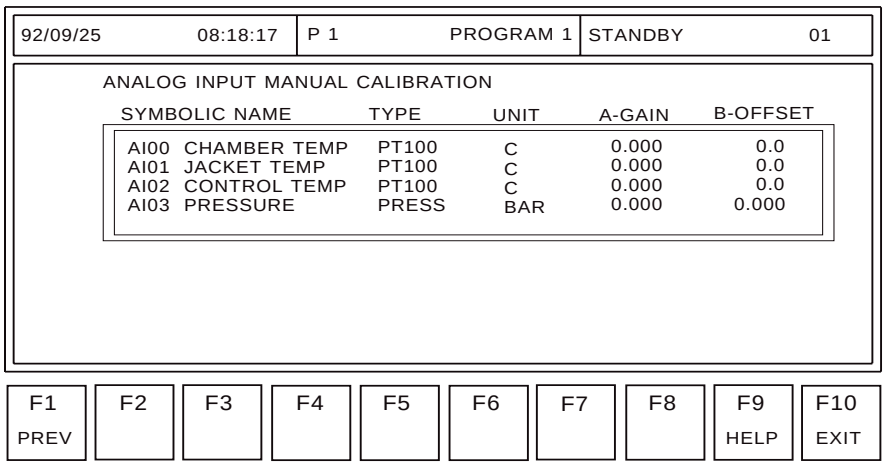


Function keys:
F1 PREV - Previous menu

F9 HELP- Help text.

Analog input manual calibration

The calibration constants gain (A) and offset (B) for analog input signals should be set in this menu.



The number of AI shown in the scrollable list is defined by the AI-modules specified in the SYSTEM CONFIGURATION MENU. A maximum of 32 AI-channels on 10 AI-modules can be specified.

A-gain is a value between 0.000 and 9.999.

The format (unit) of the B-offset is the same as that of the actual sensor. Input is limited to ±10% of the range of the actual, AI-sensor.

Function keys:
F1 PREV - Abort menu and skip all changes

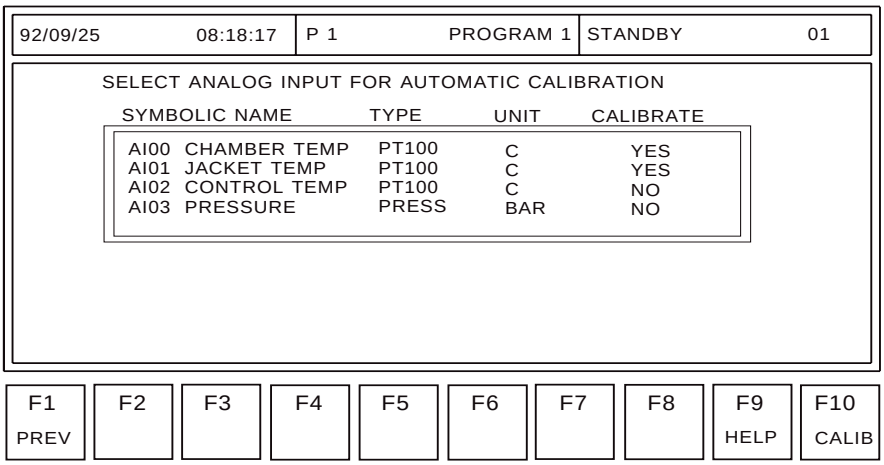
F9 HELP- Help text.

F10 EXIT - Exit menu and save changes.

Analog input automatic calibration

Selection of analog inputs

First of all the operator has to select the group of sensor to be calibrated by highlighting these.



The number of AI shown in the scrollable list is defined of the AI-modules specified in the SYSTEM CONFIGURATION MENU. A maximum of 32 AI-channels on 10 AI-modules can be specified.

A YES in the CALIBRATE field indicates that the sensor should be included in the calibration. The operator can toggle between the alternatives YES / NO with the button SPACE.

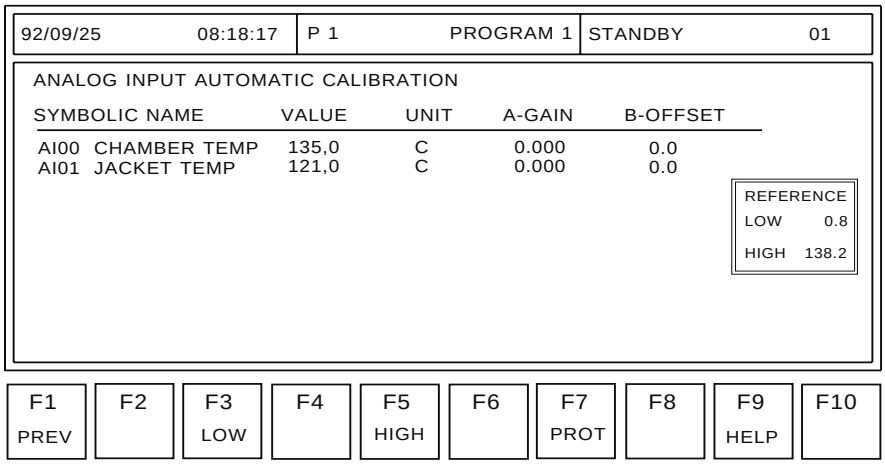
Function keys:
F1 PREV - Skip changes and go back to previous menu

F9 HELP - Help text

F10 CALIB - Go to automatic calibration.

Automatic calibration

This menu is used for automatic calibration of analog inputs.



Selected sensors are listed on the screen. A maximum of 14 sensors can be calibrated at the same time. Measured value and calculated A-gain and B-offset are continuously updated for selected sensors.

Calibration steps:

A Subject the sensors to the low reference medium and wait until the measured value is stable.

B Write the measured value in LOW REFERENCE field and push **F3** to send the value to PACS.

C Subject the sensors to the high reference medium and wait until the measured value is stable.

D Write the measured value in HIGH REFERENCE field and push **F5** to send the value to PACS.
At this time, PACS calculates new gain and offset constants. Calculated constants and measured sensor values are continuously updated on the screen.

By pushing **F7**, a calibration protocol is printed out. Before starting the print out, the operator may enter his signature in a pop up window, thereby including this signature in the protocol.

Function keys:
F1 PREV - Abort menu

F3 LOW - Send low reference to PACS

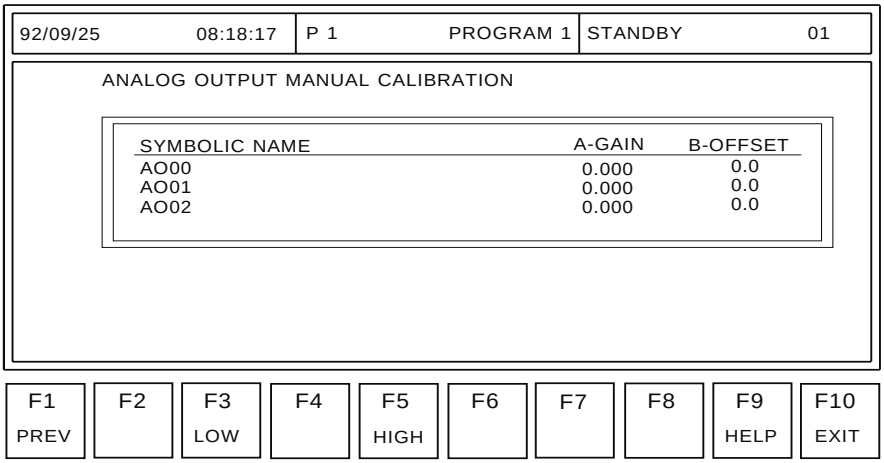
F5 HIGH - Send high reference to PACS and calculate new constants

F9 HELP- Help text.

F7 PROT - Print calibration protocol

Analog output manual calibration

This menu is to set calibration constants such as gain (A) and offset (B) for analog outputs.



The number of AO shown in the scrollable list is defined by the number of AO-modules specified in the SYSTEM CONFIGURATION menu.

Each module contains 2 channels.

A maximum of 4 AO-modules, i. e. 8 channels can be specified.

A-GAIN is a value between 0.000 - 9.999

B-OFFSET is a value between 000.0 - 100.0

A-GAIN and B-OFFSET are set directly by pressing **F10** when the factors have been modified.
Otherwise calibration can be made in accordance with following procedure:

A Enter A-GAIN and B-OFFSET for the channel to be calibrated.

B Mark calibration channel by placing the cursor in any field of this line.

C Activate LOW calibration by pushing **F3**. On this command, PACS will set actual AO-channel to 10.0% of maximum output using entered gain and offset constants.

D Activate HIGH calibration by pushing **F5**. On this command, PACS will set actual AO-channel to 90.0% of maximum output using entered gain and offset constants.

E Output value will be measured. Step A - D should be repeated until output measure is correct.

Function keys:
F1 PREV - Abort menu and skip all changes

F3 LOW - Activate low value calibration

F5 HIGH - Activate high value calibration

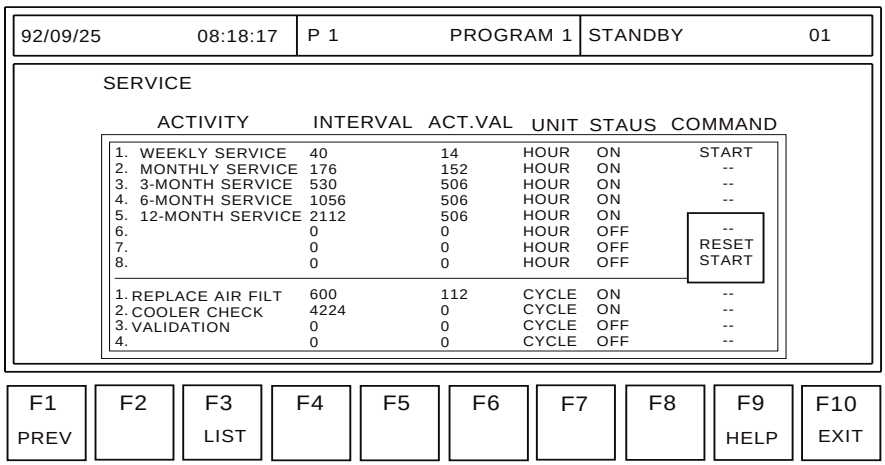
F9 HELP- Help text

F10 EXIT - Exit menu and save changes

Service

This menu is to supervise the service intervals of the sterilizer. These can be based either on time or on number of cycles. Eight of each can be defined.

When a time or cycle limit is obtained, the SERVICE system flag SF17 is set.


92/09/25 08:18:17
P 1 PROGRAM 1
STANDBY 01
SERVICE
ACTIVITY INTERVAL ACT.VAL UNIT STAUS COMMAND
1. WEEKLY SERVICE 40 14 HOUR ON START
2. MONTHLY SERVICE 176 152 HOUR ON --
3. 3-MONTH SERVICE 530 506 HOUR ON --
4. 6-MONTH SERVICE 1056 506 HOUR ON --
5. 12-MONTH SERVICE 2112 506 HOUR ON --
6. 0 0 HOUR OFF --
7. 0 0 HOUR OFF RESET
8. 0 0 HOUR OFF START
1. REPLACE AIR FILT 600 112 CYCLE ON --
2. COOLER CHECK 4224 0 CYCLE ON --
3. VALIDATION 0 0 CYCLE OFF --
4. 0 0 CYCLE OFF --
F1 PREV
F2
F3 LIST
F4
F5
F6
F7
F8
F9 HELP
F10 EXIT

F1 PREV - Previous menu

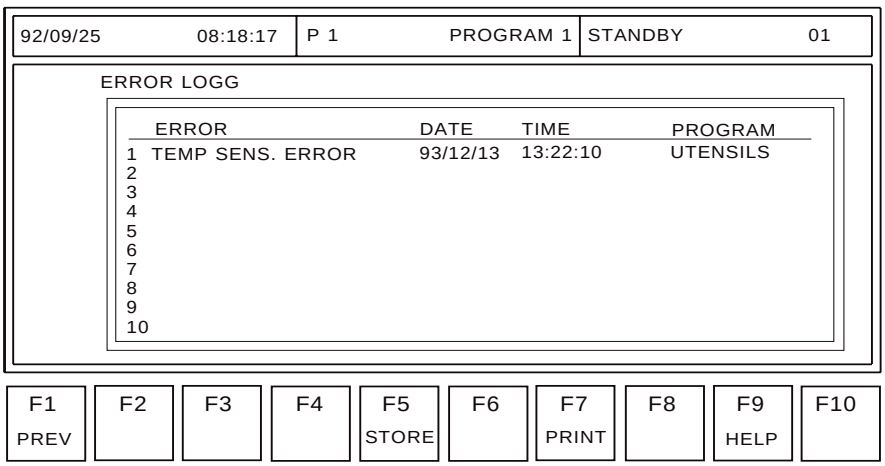
F3 LIST - Show choice list

F9 HELP- Help text.

F10 EXIT - Exit menu and save changes

Error log

This menu displays the error log. This contains type of error, date, time and the name of the program in which it occurred.



The error log contains information about the latest 20 errors. This means that the oldest message is erased each time a new error message is stored.

Function keys:
F1 PREV - Previous menu

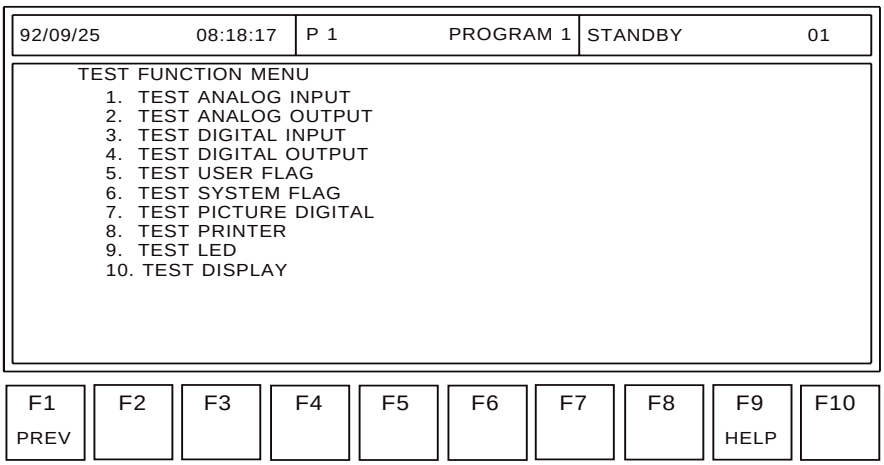
F2 STORE - Store error log on file

F7 PRINT - Print error log

F9 HELP - Help text

Test function menus

Test function menu.



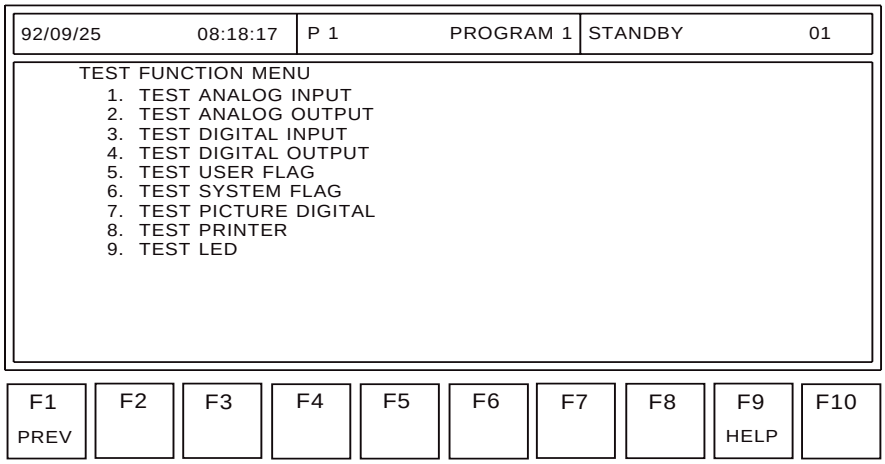
Use ↑↓ to highlight your choice, then push **ENTER**.

Function keys:
F1 PREV - Previous menu

F9 HELP - Help text

Test function menus

Test function menu.



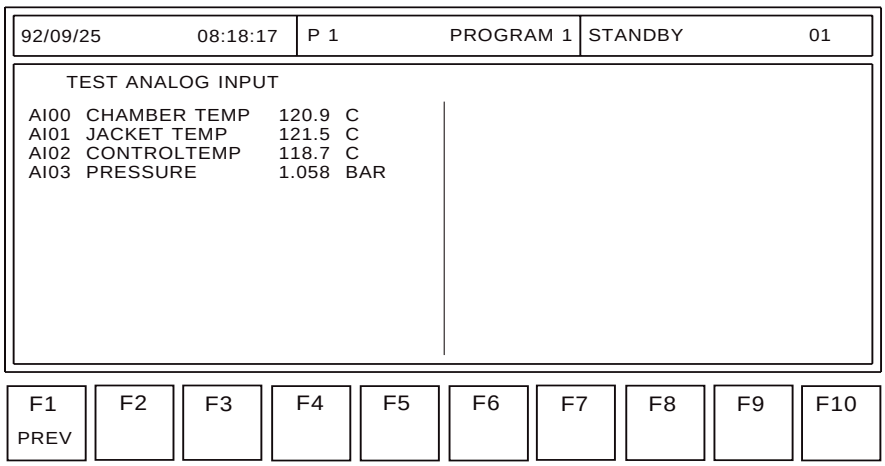
Use ↑↓ to highlight your choice, then push **ENTER**.

Function keys:
F1 PREV - Previous menu

F9 HELP - Help text

Analog input test

This menu shows all defined analog inputs in two columns on screen. Actual values are continuously updated.

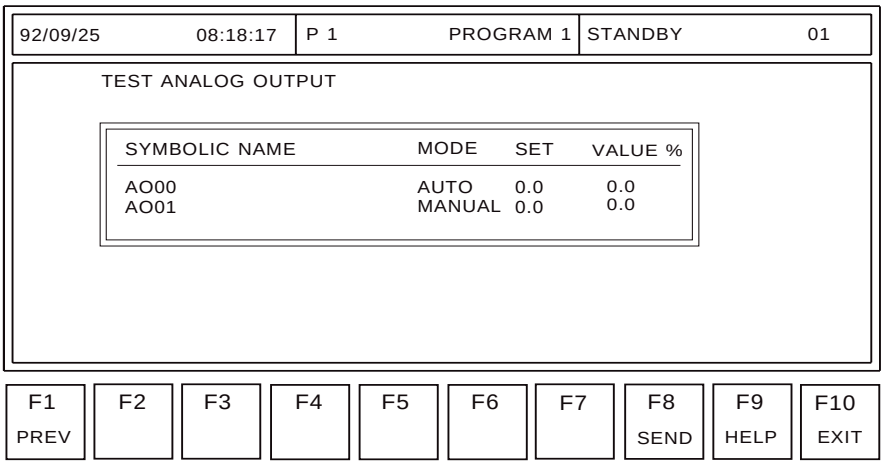


Function keys:
F1 PREV - Previous menu

Analog output test

The operator is, by setting the mode to MANUAL, disabling the built in safety system!
Make sure beyond all doubts that it is safe to set the output to manual mode before doing it.

In this menu, analog outputs can be set to desired values.
Actual values are continuously updated.



In AUTO mode the output is controlled by the PACS program

In MANUAL mode the output can be set to desired value.

The number of AO shown in scrollable form is defined of how many AO-modules are specified in SYSTEM CONFIGURATION menu Each module contains 2 channels. A maximum of 4 AO-modules can be specified i. e. 8 channels.

MODE fields specify whether the output is in AUTO or MANUAL mode. Operator can, when in these fields, toggle between the two alternatives using the SPACE bar.

In the SET field the operator can specify the value to which the output should be set. Limits for the value field is 0.0 - 100.0%. Note that MANUAL mode must be selected, otherwise SET will be ignored by PACS.

With **F8** entered values can be sent to PACS without leaving this menu.

Function keys:
F1 PREV - Abort test.

F8 SEND - Send entered values and mode to PACS.

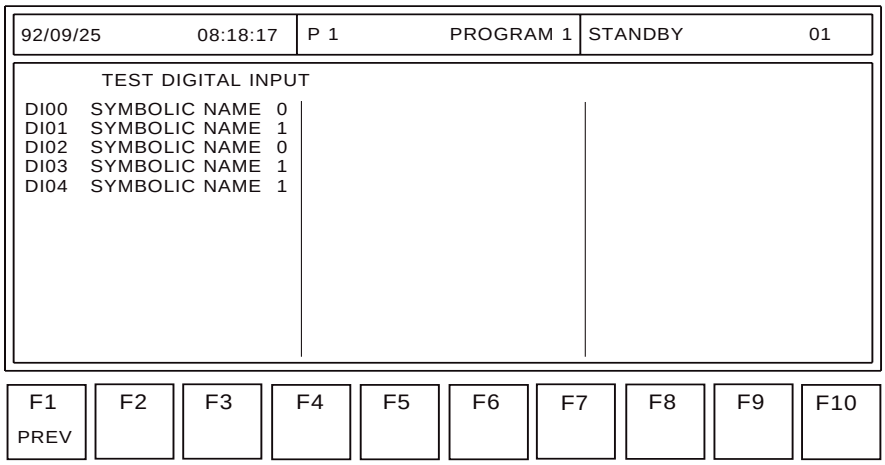
F9 HELP - Help text

F10 EXIT - Send entered values and mode to PACS and exit menu.

Remember to reset the mode to AUTO before leaving the menu.

Digital input test

This menu shows all defined digital inputs in three columns on screen. Actual values are continuously updated.

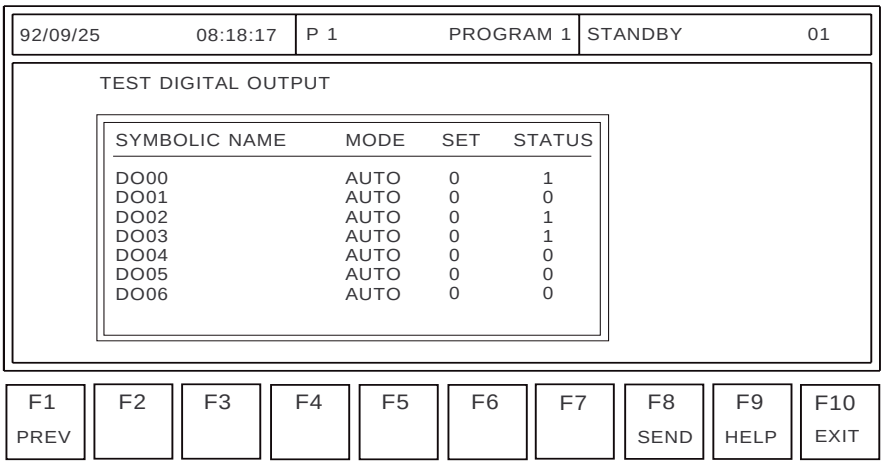


Function key:
F1 PREV - Previous menu

Digital output test

The operator is, by setting the mode to MANUAL, disabling the built in safety system!
Make sure beyond all doubts that it is safe to set the output to manual mode before doing it.

In this menu, digital outputs can be set to desired status.
Actual values are continuously updated.



In AUTO mode the output is controlled by the PACS program.

In MANUAL mode the output can be set to desired status.

The number of DO shown in scrollable form is defined of the number of DO-modules specified in SYSTEM CONFIGURATION menu. Each module contains 8 channels. A maximum of 8 DO-modules can be specified i. e. 64 channels.

MODE fields specify whether the output is in AUTO or MANUAL mode. Operator can, when in this field, toggle between the two alternatives using the SPACE bar.

In the SET fields the operator specifies the output status. Operator can, when in these fields and in MANUAL mode, toggle between 0 and 1 using the SPACE key

With **F8** entered status can be sent to PACS without leaving this menu.

Function keys:
F1 PREV- Abort test.

F8 SEND - Send entered values and mode to PACS.

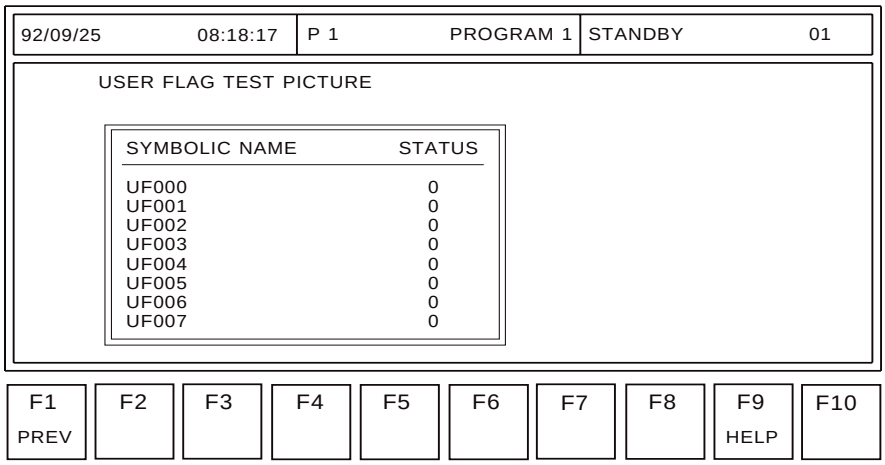
F9 HELP - Help text

F10 EXIT - Send entered values and mode to PACS and exit menu.

Remember to reset the mode to AUTO before leaving the menu.

Test user flag

This menu shows all defined user flags in a scrollable list on screen. Actual values are continuously updated.

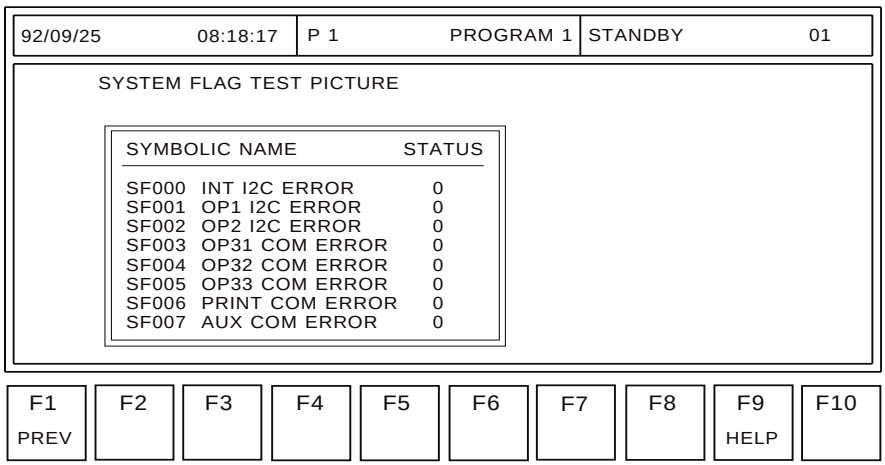


Function key:
F1 PREV - Previous menu

F9 HELP - Help text

Test system flag

This menu shows all defined system flags in a scrollable list on screen. Actual values are continuously updated.

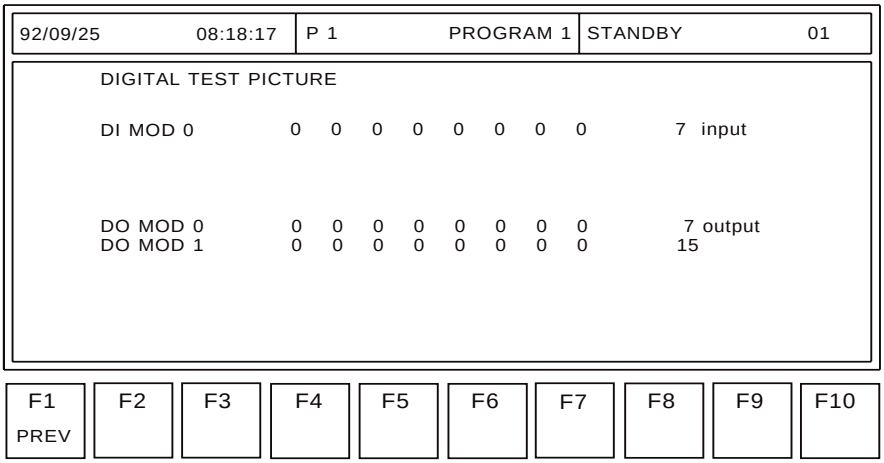


Function key:
F1 PREV - Previous menu

F9 HELP - Help text

Test picture

This menu shows the status of all digital inputs and outputs in the system. Status are continuously updated.

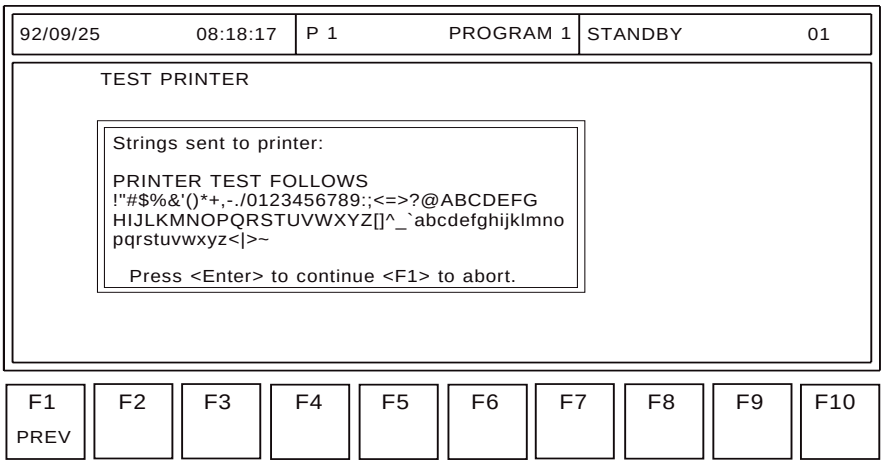


The number of shown DI / DO modules are specified in SYSTE CONFIGURATION menu.

Function key:
F1 PREV - Previous menu

Test printer

This menu sends test strings to connected printer.



Shown test strings are sent to printer by pressing **ENTER**. Test is aborted with **F1**.

Function key:
F1 PREV - Previous menu

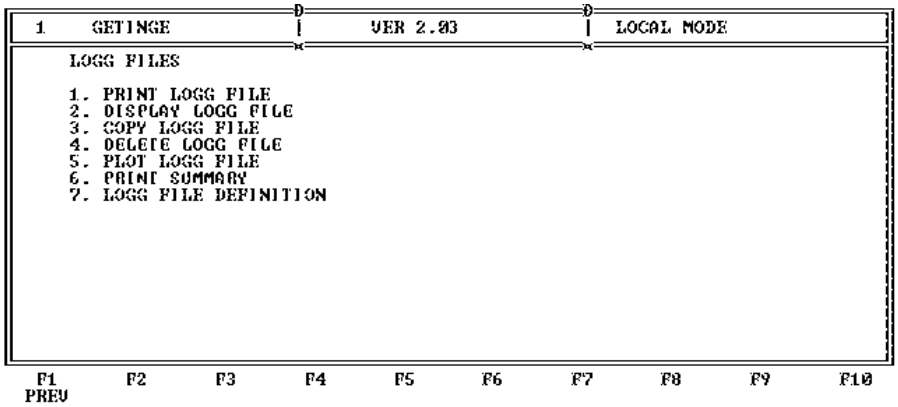
Test LED

When this menu is activated, a command is sent to PACS.

On this command, PACS makes all LED’s flash for about 5 seconds on all connected operating panels.

Log-files (OPH only)

This menu handles the log-file functions. the OP H program can store log-files from connected sterilizers on separate files.
Highlight desired alternative using the arrow-keys or simply enter the leading digit and press **ENTER**.



Function key:
F1 PREV - Previous menu

Print log-file

Print the selected log-file on a printer connected to the PC.

Highlight desired sterilizer number using the arrow-keys and press **ENTER.**
Select the log-file to be printed and press **ENTER**.

Function key:
F1 PREV - Previous menu

Display log-file

The selected file is displayed on screen.

Highlight desired sterilizer number using the arrow-keys and press **ENTER.**
Select the log-file to be shown and press **ENTER**.

Function keys:
F1 PREV - Previous menu

F6 BACK - Previous page of the log-file

F7 NEXT - Next page of the log-file

Copy log-file

The selected log-file is copied to disk and directory as decided.

- Highlight desired sterilizer number using the arrow-keys and press **ENTER.**
- Select the log-file to be copied and press **ENTER**.
- Specify the path and press **F10** to copy the file.

Function keys:
F1 PREV - Previous menu

F10 EXIT - Copy the file and leave menu

Delete log-file

A previously copied log-file is deleted.

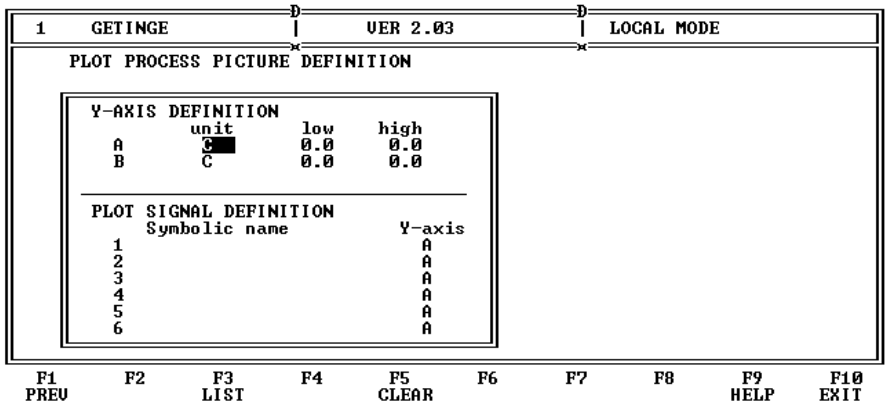
Highlight desired sterilizer number using the arrow-keys and press **ENTER.**
Select the log-file to be deleted and press **ENTER**.

Note! Only files that have been copied can be deleted.

Function keys:
F1 PREV - Previous menu

Plot log-file

The log-file may be plotted on screen in almost the same way as i described under heading ”PLOT PROCESS PICTURE”. The difference is that the plot is not depending on settings made in ”PLOT PROCESS PICTURE DEFINITION” but on settings made in this menu.



Highlight desired sterilizer number using the arrow-keys and press **ENTER.**
Select the log-file to be plotted and press **ENTER**.

Definition:
The plot picture can contain up to six signals and two y-axis.

Y-AXIS DEFINITION
Two Y-axis can be defined, A and B. An Y-axis is defined by**unit**, **low** value and **high** value.

Unit is specified via a choice list where the operator can choose between C/F, BAR/kPa/PSI, % and F0. The unit for temperature and pressure is depending on selections made in the SYSTEM CONFIGURATION menu.

Formats and limits for **high** and **low** values are determined by the active **unit**.

UNIT	FORMAT	RANGE
C	xxx.x	0.0 - 999.9
F	xxx.x	0.0 - 999.9
BAR	x.xxx	0.000 - 9.999
kPa	xxx.x	0.0 - 999.9
PSI	xx.xx	0.00 - 99.99
%	xxx.x	0.0 - 100.0
F0	xxx.x	0.0 - 999.9

An Y-axis is as activated if the value in **high** is greater than that in **low**. If Y-axis A is not activated it will not be shown. If Y-axis B is not activated it is shown unmarked.

PLOT SIGNAL DEFINITION
Process picture signals are specified via a two step choice list where the operator can choose between defined AI, AO, F0, CP, DF and TP functions.

Y-AXIS defines which Y-axis a signal is related to. The operator can toggle between the alternatives A/B with **SPACE** when in these fields.

Function keys:
F1 PREV - Abort menu and skip all changes

F3 LIST - Show choice list

F5 CLEAR - Clear active field

F9 HELP - Help text

F10 EXIT - Exit menu and save changes

Print summary

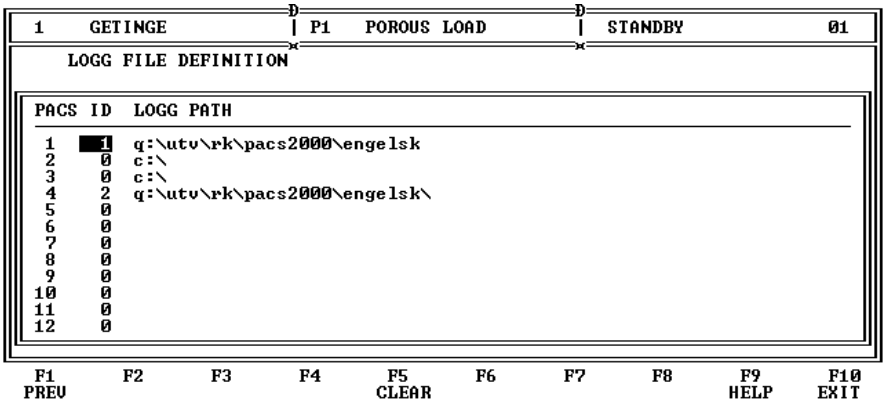
An abstract containing the information listed below is sent to the printer connected to the PC.

- Header

- All phase shifts accompanied with a log.
- All errors together with log.

Log-file definition

This menu manages the definition of the log-file. Up to 20 sterilizers may be defined.



PACS ID is the unique number of the sterilizer as set in the SYSTEM CONFIGURATION MENU.
LOG-PATH describes the full way to the directory where the log-file is to be stored.

The following steps has to be taken before logging can be started.

- OP33 in SYSTEM CONFIGURATION MENU set on.
- System flag SF29 PC DISK LOG set.

The file name is composed in the following way:
<STERILIZER No:><MONTH><DAY><RUNNING No.>.LOG

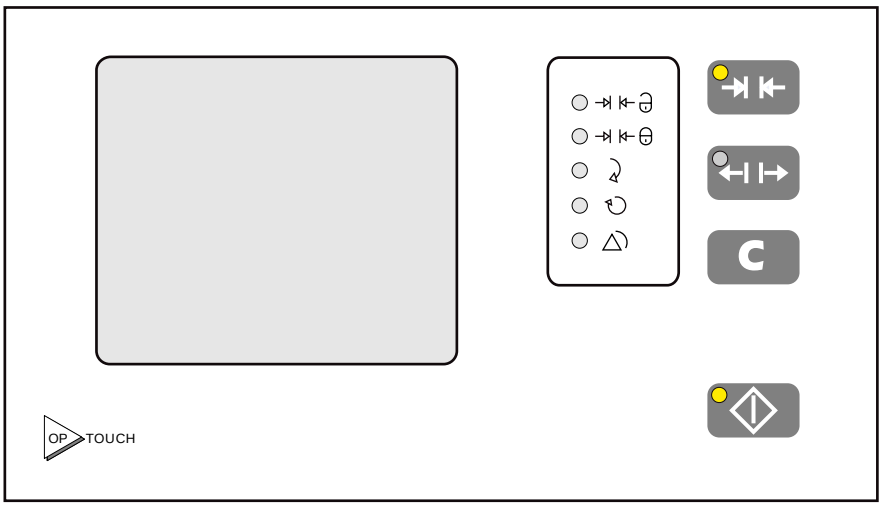
Function keys:
F1 PREV - Abort menu and skip all changes

F5 CLEAR - Clear active field

F9 HELP - Help text

F10 EXIT - Exit menu and save changes

OP-Touch



OP-Touch is an operator panel constructed as a PC on a card. It is fitted with a 'touch screen'. OP-Touch has no hard disk for data storage.

OP-Touch communicates with PACS 2000 and a connected printer via an RS232 serial interface.

ZSE057 . . . . . OP-Touch General

Display layout

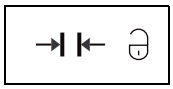
The display is divided into seven windows, each of which shows different information.

1 **2** **3** **4**				
5 **6**				
7				

Window 1	displays sequence number and symbolic name of the active PACS program
Window 2	displays the program time
Window 3	displays symbolic name and subprocess number for the active PACS phase
Window 4	displays the phase time
Window 5	is used for menus, entry fields, lists of functions and process displays
Window 6	displays error messages and information when window 5 displays process displays. At other times displays system messages
Window 7	displays a row of buttons containing current options

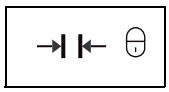
Signal lamps

Door(s) closed
Yellow LED



indicates that all the doors of the sterilizer are closed.

Door(s) sealed and locked
Yellow LED



indicates that all the doors of the sterilizer are secured closed so that they cannot be opened unintentionally.

Process running
Yellow LED

indicates that a fully-automatic sterilization process is running.

Process complete
Green LED

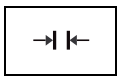
indicates that a sterilization process has been performed as per program, so that the intended door can be opened.

Fault
Red LED

indicates that a fault has occurred.

Pushbuttons

CLOSE DOOR

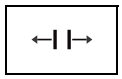


Push button with yellow LED

No function on sterilizers with manually operated doors.

The button is to close that door which is located on the same side as the button. The button may, depending on the programming, be of the impulse or maintained type.With the impulse type, the light diode indicates that a closing command has been given.With the maintained type, the button should be kept depressed until the door is completely closed which state is indicated by the light diode illuminating.

OPEN DOOR



Push button with yellow LED

No function on sterilizers with manually operated doors.

The button is to open that door which is located on the same side as the button. The button may depending on the programming be of the impulse or maintained type. With the impulse type, the light diode indicates that an opening command has been given. With the maintained type, the button should be kept depressed until the door is completely open which state is indicated by the light diode illuminating.

“C” Pushbutton

The **C** pushbutton is used to:

A confirm that an alarm has been noticed, and thus to shut off the audible alarm and the display indication.

B advance the program manually by one step each time the button is pressed. Used when there is a fault and during servicing.

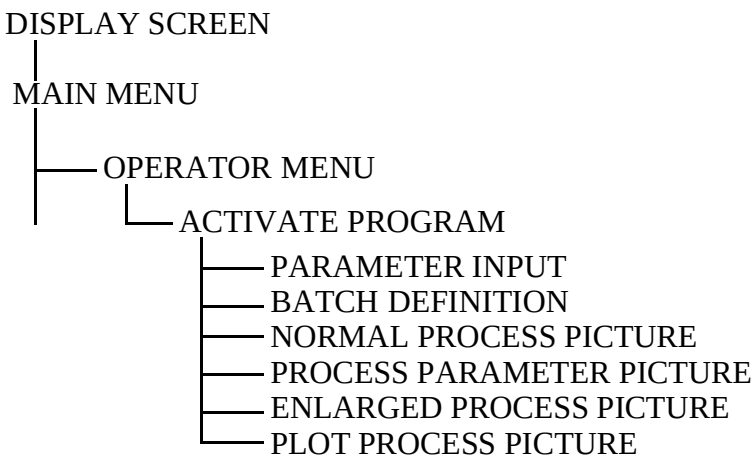
START Pushbutton

A sterilization process is started by pressing this button when all start conditions are met. This is indicated by the LED lighting up.

ZSE059 . . . . . OP–Touch Menu tree for the operator

OP–Touch menu tree

The parts of the menu tree used by the operator are shown below.



ZSE060 . . . . . OP-Touch Menu tree for service

OP-Touch menu tree

The parts of the menu tree used by the service personnel are shown below.

- DISPLAY SCREEN
  - MAIN MENU
    - OPERATOR MENU
      - ACTIVATE PROGRAM
        - PARAMETER INPUT
        - BATCH DEFINITION
        - NORMAL PROCESS PICTURE
        - PROCESS PARAMETER PICTURE
        - ENLARGED PROCESS PICTURE
        - PLOT PROCESS PICTURE
    - SERVICE MENU
      - CALENDAR
      - CALIBRATION MENU
        - ANALOG INPUT MAN. CALIBR.
        - ANALOG INPUT AUTO. CALIBR.
        - BRIDGE COMPENSATION TABLE
      - SERVICE
      - ERROR LOG
      - TEST FUNCTION MENU
        - TEST ANALOG INPUT
        - TEST ANALOG OUTPUT
        - TEST DIGITAL INPUT
        - TEST DIGITAL OUTPUT
        - TEST USER FLAGS
        - TEST SYSTEM FLAGS
        - TEST PRINTER
        - TEST LED
      - REVISION DATES
    - SYSTEM MENU
      - SYSTEM DEFINITION MENU
        - SYSTEM CONFIGURATION
        - PRINTER CONFIGURATION
        - NORMAL PROCESS PICTURE
        - ENLARGED PROCESS PICTURE
        - PLOT PROCESS PICTURE
      - SERVICE
      - PROGRAMMABLE PARAMETERS
      - DOCUMENTATION

Passwords

There are four passwords in PACS 2000. They consist of four digits 0000 - 9999. The passwords are:

- **authority code**
  required to start blocked processes and to open the door after a process fault
- **parameter code**
  required to make the program accept changes to program parameters.
- **service code**
  required to gain access to maintenance menus
- **programming code**
  required to gain access to menus for programming

As an alternative, the password for parameter changes can be replaced by a pass key connected to a digital input. The pass key takes precedence over the password for parameter change.

Passwords on delivery:
The passwords set in the control system are listed in a special document which is supplied in a sealed envelope together with the manuals for the sterilizer.

Menu descriptions

ZSE062 . . . . . OP-Touch menu description, operator menus

Display screen

This menu is used to set the display screen to give the best possible legibility for the prevailing conditions.

Main menu

In the main menu the operator can choose to go back to the operator menus or move on to the service or system menus. Note that both these options are password-protected.
To choose the required option, press the option on the screen or select it with the arrow keys and confirm with ENTER.

The “OP 2,5 setup” key leads to the “Display screen” menu

Activate program

This menu is shown when the unit is powered on.

Available programs are displayed in window 5 in groups of eight. Where there are more than eight programs, the >> button is used to call up the next group. The << is used to go back.

To choose a program, press the program name on the screen.

The next menu to appear is “Parameters”.

Press the PREV key to return to the main menu.

Note that this menu display only appears when no process is running. When a process is running, one of the process displays is always displayed; which one depends on the choices made.

Parameter input

This menu is only displayed when the control system is in the stand-by phase.

Initially, none of the parameters displayed is selected (highlighted). A correct password must be entered before a parameter can be changed. Pressing the EDIT key in window 7 brings up a new menu display in which the password can be entered.

When the password has been accepted, the “Parameters” menu appears again, but in a different form. Choose the parameter to be changed by moving the cursor to it with the arrow keys, then press EDIT.

An entry menu now appears, with a numerical field in the top right corner. The chosen parameter is displayed together with the current setting and the limits within which the parameter can be set. A new value is entered into the numerical field. Press ENTER to return to the previous menu display. Pressing PREV cancels any changes made an returns the previous menu display.

Save the new value by pressing SAVE. Do not make changes and return to the previous menu by pressing PREV.

Batch definition

This menu appears only when the control system is in the stand-by phase.

The operator must enter the relevant batch data. These data are part of the information in the printed report. Here, the operator can select a field by pressing it or by using the arrow keys. When a field has been selected, the operator presses EDIT. The field changes to an alphanu-

meric keyboard which can be used to enter the required details. The SYMB key is used to call up additional characters to the keyboard.

Press ENTER to return to the previous menu with the changes made. From the “Batch data” the operator can press PREV to return to the “Choose program” menu or ENTER to go to “Normal process display”.

Normal process picture

Up-to-date data from the control system is continuously shown in this menu. No entries can be made in this menu. Seven parameters are displayed at a time. Pressing the MORE key displays the next seven parameters.

The operator can press the OTHER key to switch to a menu display with options for choosing further ways of displaying the running process. The required method of display is chosen by pressing the relevant line or by moving the cursor to the desired point on the menu with the arrow keys. The chosen method of display is started by pressing the NEXT key.

Process parameter picture

This menu shows the parameters of the process. The parameters displayed included parameters that the operator can change and others that are simply displayed. Every display contains seven parameters. Pressing MORE brings up the next set of seven parameters.

Enlarged process picture

This menu continuously displays current data from the control system in large characters so that the operator can read the display from a greater distance. Up to four parameters can be displayed at a time. The parameters to be displayed are defined in the system definition menu.

Plot process picture

This menu display shows current data in the form of plots on the screen. Up to six signals and two y-axes can be displayed at a time. Signals and y-axes are defined in the system definition menu. To display this definition, press the DEF button. This menu can also be used to change the appearance of the line that represents a particular signal. Pressing the CHANGE button toggles line type between thick, thin or none.

The length of the x-axis adjusts automatically to suit the currently running program. The active program and phase time appear in the header.

Service menu

This menu is accessed via the main menu. A Level 2 password or higher is required.

The required option is selected with the arrow keys and confirmed by pressing ENTER. The PREV key returns the main menu.

Calendar

This menu is used to change the date and time both in PACS and on the operator panel. The date format is specified in the “System configuration” menu.

Possible formats are:

SW	YY/MM/DD
US	MM/DD/YY
EU	DD/MM/YY

Time is displayed in 24-hour format, ie 00:00:00 — 23:59:59

The PREV key cancels the changes and returns the previous menu display.

The SAVE key saves the changes and quits the menu.

DATE and TIME change the display to an entry display containing a numerical field in the top right corner. To quit this menu, either press PREV, which cancels any changes, or ENTER, which saves the changes. Note that the changes must be saved before quitting the Calendar menu.

Calibration

The required option is selected with the arrow keys and confirmed with ENTER. The PREV key is used to quit the menu without performing any action.

Manual calibration of analog input

A scrollable list of defined analog inputs appears on the screen. The calibration constants A-GAIN and B-OFFSET can be specified in this menu.

A-GAIN is a value in the range 0. 000 - 9. 999.

The format of B-OFFSET is the same as for the current input and the limits for entry are set to ±10% of the range of the actual sensor.

Press PREV to quit the menu and cancel any changes.

Press SAVE to quit the menu and save any changes.

Press EDIT to change the values for a chosen input, having selected the desired input with the arrow keys. A new menu display with a numerical field appears. Use the GAIN and OFFSET keys to choose which value is to be changed. Press ENTER to quit the menu and save the changes. Press PREV to quit the menu and cancel the changes.

Automatic calibration of an analog input

A scrollable list of defined analog inputs appears on the screen. First the operator must choose a group of sensors to be calibrated. This is done by selecting the required input with the arrow keys and using the YES/NO key to change the setting under CALIBRATE from NO to YES. The setting toggles between YES and NO every time the YES/NO key is pressed. The control system gives an alarm if sensors of different kinds are selected for calibration at the same time.

Press PREV to quit the menu and cancel any changes.

Press CALIB to start calibrating the chosen inputs. The display changes to an entry menu with a numerical field. The LOW and HIGH buttons are used to choose which value to enter.

The PREV key quits the menu, cancels the changes and returns to the previous menu display. Press ENTER to proceed to the next menu keeping the changes.

The next menu display shows a list of the selected sensors. Up to 14 sensors can be displayed at a time.

The calibration procedure is as follows:

The example below describes calibration of temperature sensors but the method is the same for pressure sensors.

- Place the sensors in a medium which is at the temperature stated as the low reference value. Wait until the temperature is stable and measure it.
- If necessary, change the value specified as LOW REF by pressing EDIT (shows the previous menu display).
- Press SET LOW to accept the value. The text in the button disappears and after about five seconds SET HIGH appears.
- Place the sensors in a medium which is at the temperature stated as the high reference value.
- If necessary, change the value specified as HIGH REF by pressing EDIT (shows the previous menu display but now the value for LOW REF cannot be changed).

- Press SET HIGH to accept the value. This time, PACS begins to calculate new values for the calibration constants. The calculated constants and measured sensor values are continuously updated on the screen. SET HIGH and EDIT disappear from the buttons.
- The right-hand button shows PRINT instead. Pressing it prints out a report on the calibration. Before printing starts, a window appears with an alphanumeric keyboard which the operator can use to enter his/her initials. The initials are printed on the report.
- Press PREV to quit the menu and cancel changes made.
  Press ENTER to start printing.
  Press SYMB to change symbols in the numerical field.

Bridge compensation table

The system contains four bridge compensation tables. Each table has seven lines of Rb, GAIN and OFFSET parameters. The operator uses the PREVT and NEXTT keys to switch between the four tables.

Rb is a value between 3000 and 4000 ohms.

Gain is a value between 0 and 999.9
Offset is a value between -999.9 and 999.9

Press PREV to quit the menu and cancel any changes.
Press SAVE to quit the menu and save any changes.
Press EDIT to change existing values.

The display changes to an alphanumeric keyboard which the operator can use to enter a name for the sensor.

Press PREV to return to the previous menu display and cancel any changes.

Press SYMB to changes symbols in the numerical field.
Press NEXT to proceed to the next menu display.

In the next display there is a numeric field where new values for the constants can be entered. The arrow keys are used to select (highlight) the desired value. Initially, the top value in the Rb column is selected. The arrow key is used to move the highlight through all values in the three columns as if they formed an endless loop.

PREV brings up the previous display.
NEXT brings up the first menu display so that a new table can be chosen.

Service

There are two types of service alarm, one based on accumulated process time and one based on the number of processes run. The required option is selected with the arrow keys and chosen with NEXT. The menu display changes to show all alarms based on the chosen option.

The desired alarm is selected with the arrow keys. The RESET key zeros the value in the PRESENT column. The entire list can be printed out by pressing the PRINT key. The PREV key brings up menu display number one, where another category of alarm can be chosen.

Error log

This display shows a list containing the last twenty faults. The arrow keys can be used to scroll through the list.
PREV quits the menu display and brings up the service menu.
PRINT prints out the entire list.

Test functions

The menu display shows a list of the functions that can be tested. The desired option is selected with the arrow keys and chosen with ENTER. The PREV key is used to quit the menu and return to the service menu.

Test analog inputs

This menu display shows a list of analog inputs. The arrow keys can be used to scroll through the list. Current values are continuously updated.

To quit the menu press the PREV key. The Test functions menu re-appears.

Test analog outputs

The operator is, by setting the mode to MANUAL, disabling the built in safety system!
Make sure beyond all doubts that it is safe to set the output to manual mode before doing it.

In this menu the desired values can be set at analog outputs. Current values are updated automatically. If the MODE field is set to AUTO, the output is controlled by the PACS-program. If it is set to MANUAL, the output can be controlled to the desired value.

The desired output is selected with the arrow keys and chosen with EDIT. The display changes to an entry display with a numeric field. In this display the operator can switch between AUTO and MANUAL, and can change the value of the output from 0.0 to100.0%. The PREV key brings up the previous menu display, where any changes can be sent

to PACS with the SEND key. Pressing PREV brings up the Test menu display again.

Remember to reset the mode to AUTO before leaving the menu.

Test digital inputs

This menu shows a list of digital inputs. Use the arrow keys to scroll through the list. Current values are continuously updated.

To quit the menu press the PREV key. The Test functions menu re-appears.

Test digital outputs

The operator is, by setting the mode to MANUAL, disabling the built in safety system!
Make sure beyond all doubts that it is safe to set the output to manual mode before doing it.

In this menu the desired values can be set at digital outputs. Current values are updated automatically. If the MODE field is set to AUTO, the output is controlled by the PACS-program. If it is set to MANUAL, the output can be controlled to the desired value by adding a 0 or a 1.

The desired output is selected with the arrow keys and chosen with EDIT. The display changes to an entry display with a numeric field. In this display the operator can switch between AUTO and MANUAL, and can change the value of the output between 0 and 1. The PREV key brings up the previous menu display, where any changes can be sent to PACS with the SEND key. Pressing PREV brings up the Test menu display again.

Remember to reset the mode to AUTO before leaving the menu.

Test user flags

This menu display shows a list of menu flags. Use the arrow keys to scroll through the list. Current values are continuously updated.

To quit the menu press the PREV key. The Test functions menu re-appears.

Test system flags

This menu display shows a list of system flags. Use the arrow keys to scroll through the list. Current values are continuously updated.

To quit the menu press the PREV key. The Test functions menu re-appears.

Test printer

This function sends a string containing characters to the printer.

Test LEDs

This function makes all LEDs flash three times.

Revision date

The function has two menu displays. In the first the operator can choose programs and phases. The required option is highlighted with the arrow keys and chosen with ENTER.

A display showing all included elements and their revision date no appears. The arrow keys can be used to scroll through the list. Pressing PRINT prints out the list. PREV brings up the previous menu display.

System menu

The required option is highlighted with the arrow keys and chosen with ENTER. The PREV key brings up the main menu. Access to the menus requires a Level 4 password.

System definition menu

The required option is highlighted with the arrow keys and chosen with ENTER. The PREV key brings up the main menu.

System configuration

The required option is highlighted with the arrow keys and chosen with EDIT.

If “Sterilizer name” is highlighted, an alphanumeric keyboard is displayed. The keyboard is used to enter a name. Press ENTER to return to the choice display.

If “Sterilizer number” or “Password” is highlighted, a numeric field is displayed. Press ENTER to return to the choice display.

If “Date format” is highlighted, the keys at the bottom of the screen temporarily show PREV / SW / US / EU / SAVE. The required format is chosen by pressing one of the three keys in the middle.

Pressing SAVE saves any changes and displays the system definition menu. Pressing PREV cancels any changes and displays the system definition menu.

Printer configuration

The required option is highlighted with the arrow keys and chosen with EDIT. Which menu display appears depends on which field the cursor was in.
SAVE saves any changes and brings up the system definition menu.
PREV cancels any changes and brings up the system definition menu.

If the “Batch log head” field was highlighted, an alphanumeric keyboard appears so that a header can be typed in. Pressing ENTER saves the change and brings up the previous menu. Pressing PREV cancels any changes and brings up the previous menu.

If any of the fields “Interval”, “Slow” or “Fast” was highlighted, a display appears with a numeric field for the entry of new values. Pressing ENTER saves any changes and brings back the choice display. PREV cancels any changes.

If the “Mode” field was highlighted, a new choice display appears, in which the required option can be selected with the arrow keys. Pressing ENTER saves any changes and brings back the choice display. PREV cancels any changes.

If the “Printer” field was highlighted, a new choice display appears, in which the required option can be selected with the arrow keys. Pressing ENTER saves any changes and brings back the choice display. PREV cancels any changes.

If the highlight is in any of the “Logging” fields, the EDIT ke becomes an ON/OFF key. Pressing ENTER saves any changes. PREV cancels any changes.

Normal process picture

The first display shows seven lines and for each line which parameters apply. The required line is selected with the arrow keys and chosen with the EDIT key.
SAVE saves any changes and brings up the “System definition menu”.
PREV cancels any changes and brings up the “System definition menu”.

A choice display appears for the chosen line. In this display the operator can determine what kind of parameters to display. The required option is selected with the arrow keys and chosen with ENTER.
CLEAR removes all data and brings up the previous display.

PREV cancels any changes and brings up the previous display.
ENTER brings up the next display.

This choice display lists all available parameters of the type chosen in the previous display. The required parameter is selected with the arrow keys and chosen with ENTER.
PREV cancels any changes and brings up the previous display.
ENTER brings up the “Normal process display” menu.

Enlarged process picture

See the description above.

Plot process picture

In this menu display the operator can choose to work on defining the Y-axis or defining included signals. The required option is selected with the arrow keys and chosen with ENTER.
PREV brings up the “System definition menu”

Defining the Y-axis
Two Y-axes can be defined with this menu display. The required option is selected with the arrow keys and chosen with EDIT.

If the cursor was in a “unit” field, the EDIT key changes to CHANGE. Pressing this key scrolls through all available units.

If the cursor was in a “value” field, a new display appears, showing a numeric field in which new values can be typed. SAVE saves any changes and brings up the first menu display.
PREV cancels any changes and brings up the first menu display.

Definition of included signals
Here the operator can choose which signals are to be displayed and determine which Y-axis the parameter belongs to. The required option is highlighted with the arrow keys and chosen with EDIT.
SAVE saves any changes and brings up the “Graphical process display” menu display.
PREV cancels any changes and brings up the “Graphical process display” menu display.

If the cursor was in a “Y-axis” field, the EDIT key changes to A/B. It can then be used to break the axis.

If the cursor was in any of the fields that represent included signals, a choice display appears for the chosen line. Here the operator can determine which type of parameter to display. The required option is highlighted with the arrow keys and chosen with ENTER.
CLEAR removes all data and brings up the previous display.
PREV cancels any changes and brings up the previous display.
ENTER brings up the next display.

This choice display lists all available parameters of the type chosen in the previous display. The required parameter is selected with the arrow keys and chosen with ENTER.
PREV cancels any changes and brings up the previous display.
ENTER brings up the “Graphical process display” menu.

Service alarms

There are two different types of service alarm. One is based on the length of the total process time; the other is governed by the number of processes completed. In the first, the arrow keys can be used to select the type of alarm to work with. The PREV brings up the “Syste menu”, whilst NEXT brings up the next menu, retaining the choice made.

The next display shows all alarms of the chosen type. Select the required option with the arrow keys or, to create a new alarm, move the cursor to a blank line and press ENTER.

The display changes to an alphanumeric keyboard. To create a new alarm, enter a name on the “Activity” line and press NEXT.
Press PREV to cancel any changes and return to the previous menu display.
Press SYMB to change symbols in the numerical field.

The next display shows the chosen/created alarm and a numerica field in which the operator enters a value at which the alarm is to be given. For and existing alarm, the current value of the counter/clock is also displayed.
PREV cancels any changes and returns to the previous menu.
RESET resets the counter to zero.
ACTIVE is used to toggle the alarm between active and inactive.
ENTER keeps any changes and goes back to the second display in the sequence.
PREV cancels any changes and goes back to the second display in the sequence.

Programmable parameters

To choose a program, the operator uses the arrow keys to move the cursor to the required program and presses ENTER.
Pressing the PREV key brings up the “System menu”.

The next menu display contains a list of the parameters that can be programmed in the chosen program.
Initially, none of the parameters displayed is highlighted. Before any parameter can be changed, the correct password must be entered. Pressing the EDIT key brings up a new menu display in which the password can be entered.

When the password has been accepted, the “Parameters” menu appears again, but looks different. Choose the parameter to be changed by moving the cursor to it with the arrow keys and then press EDIT.

An entry menu now appears, with a numeric field in the top right corner. The chosen parameter is displayed, with its current setting and the limits within which the parameter can be set. A new value can be entered in the numeric field. Pressing ENTER brings back the previous menu display. Pressing PREV cancels any changes and brings back the previous menu display.

Press SAVE to save the value and return to the “System menu”. Press PREV to return to “System menu” display without making any changes.

Documentation

The first menu display lists the items that can be printed out. With programs and phases there is a choice between printing out everything or just one. Select the required option with the arrow keys. If the operator chose to print the system definition, all programs or all phases, the printout is produced as soon as the operator presses ENTER.

If the operator chose to print out individual programs or phases, a further menu display appears, in which the program or phase to be printed out can be selected. Printing starts when PRINT is pressed.
PREV cancels the choice made and brings back the previous menu display.

ZSE024 . . . . . OP3 test display

Test display

When this menu is activated all pixels in the LCD display are switched on/off for about 5 seconds.

ZSE066 . . . . . Instructions for cold-starting PACS2000 general

Restoring software from E-PROM (cold start)

A cold start may only be carried out with the sterilizer in the safe position and by a technician who is thoroughly familiar with the sterilizer process.

A cold start of the control system can be run through by pressing the button on the CPU board marked COLD START for a few seconds.

When programs are loaded from a PC or a cold start is performed from the E-PROM, the system will end up in the stand-by phase, which means that risky situations may arise.

Before loading/cold start can take place, the equipment must be put in the transferred to a non-dangerous position. See instructions for action to be taken before a cold start in the chapter on GENERAL ADVICE.

If necessary, contact GETINGE AB's Automation Department fo instructions.

Technical data

PACS 2000 Ver. 2.0

Adaptation to line voltage by means of transformer		2 * 18 ±10% VAC, 50 - 60 Hz
Power consumption depending on the degree of extension		< 100 VA
Operating ambient temperature		+10 - +60 °C
Humidity resistance	control system	90% rel.
	front panels	100% rel.
Water and dust protection of	control system	IP43
	front panel	IP65
Electromagnetic compatibility		FCC 15 J, CIS P R22, EN 50081, EN 50082, IEC 801
PC board performance according to		CSA and UL
Maximum distance between operator panel and control unit		10 m
System sampling rate for all in- and outputs		4 Hz
Type of digital inputs supplied from system		Opto-coupled 24 V DC
Number of digital input modules		Maximum 8
Number of inputs with each module		8
Type of digital outputs		Relays, contact rating 12 A
Number of digital output modules		Maximum 8
Number of digital outputs with each module		8
Number of analog input modules		Maximum 10
Number of analog inputs.-	PACS 2000 alone	Maximum 32
	if PACS Supervisor is connected	Maximum 24
Number and kind of analog inputs with module type:	1.	3 RTD Pt100
		1 pressure

2. 3 thermocouple type K
   1 pressure
3. 6 RTD Pt100
4. 6 thermocouple type K
5. 2 RTD Pt100
   2 pressures
6. 4 general purpose
   - 0 - 20 mA
   - 0 - 5 V
   - 0 - 10 V
   - 4 - 20 mA*1

Analog inputs type:

A. Temperature

Sensor	Pt100 4-wire only
Resolution	0,1 ^{o}C
Inaccuracy	±0,1 ^{o}C
Range	-5 - +150 ^{o}C

B. Temperature

Sensor	TC type K, Chromel-Alumel
Resolution	0,1 ^{o}C
Inaccuracy	±0,2 ^{o}C
Range	-5 - +150 ^{o}C

C. Temperature

Sensor	TC type K, Chromel-Alumel
Resolution	0,2 ^{o}C
Inaccuracy	±0,4 ^{o}C
Range	-5 - +800 ^{o}C

D. Pressure

Sensor	Wheatstone bridge
	0 - 500 mV/v
Resolution	0,001 bar(a)
Inaccuracy	±0,01 bar(a) for 0 - 1 bar(a) ±1% of actual value for 1 - 5 bar(a)
Range	0 - 5 bar(a)

E. Pressure

Sensor	Wheatstone bridge
	0 - 300 mV/v
Resolution	0,001 bar(a)
Inaccuracy	±0,001 bar(a)
Range	0 - 1,5 bar(a)

F. General purpose

Sensor	0 - 20 mA, 4 - 20 mA[*1],
	0 - 5 V, 0 - 10 V
Inaccuracy	0,1% of span
Range	As above

G. Scale

Sensor	0 - 20 mA, 4 - 20 mA[*1],
	0 - 5 V, 0 - 10 V
Inaccuracy	0,1% of span
Range	0 - 500 kg

H. Concentration

Sensor	0 - 20 mA, 4 - 20 mA[*1],
	0 - 5 V, 0 - 10 V
Inaccuracy	0,1% of span
Range	0 - 1200 mg/l

Analog outputs	0 - 20 mA, 4 - 20 mA, 0 - 5 V, 0 - 10 V Resolution 0,4% Activation rate 4 Hz
Number of analog output modules	Maximum 4
Number of analog outputs with each module	2

*1. All four inputs on the module will be set for 4 - 20 mA when this alternative is used.

PACS 2000 Ver. 2.13

TECHNICAL DATA

Adaptation to line voltage by means of transformer		2 * 18 ±10% VAC, 50 - 60 Hz
Power consumption depending on the degree of extension		< 100 VA
Operating ambient temperature		+10 - +60 °C
	with OP-Touch	+10 — +40°C
Humidity resistance	control system	90% rel.
	front panels	100% rel.
Water and dust protection of	control system	IP43
	front panel	IP65
Electromagnetic compatibility		FCC 15 J, CIS P R22, EN 50081-1, EN 50082-1, IEC 801
PC board performance according to		CSA and UL
Maximum distance between operator panel and control unit		10 m
System sampling rate for all in- and outputs		4 Hz
Type of digital inputs supplied from system		Opto-coupled 24 V DC
Number of digital input modules		Maximum 8
Number of inputs with each module		8
Type of digital outputs		Relays, contact rating 12 A
Number of digital output modules		Maximum 8
Number of digital outputs with each module		8
Number of analog input modules		Maximum 10
Number of analog inputs.-	PACS 2000 alone	Maximum 32
	if PACS Supervisor is connected	Maximum 24

Number and kind of analog inputs with module type:	1.	3 RTD Pt100 1 pressure
	2.	3 thermocouple type K 1 pressure
	3.	6 RTD Pt100
	4.	6 thermocouple type K
	5.	2 RTD Pt100 2 pressures
	6.	4 general purpose 0 - 20 mA 0 - 5 V 0 - 10 V 4 - 20 mA[*1]

Analog inputs type:	A. Temperature	
	Sensor	Pt100 4-wire only
	Resolution	0,1 ^{o}C
	Inaccuracy	±0,1 ^{o}C
	Range	-5 - +150 ^{o}C
	B. Temperature	
	Sensor	TC type K, Chromel-Alumel
	Resolution	0,1 ^{o}C
	Inaccuracy	±0,2 ^{o}C
	Range	-5 - +150 ^{o}C
	C. Temperature	
	Sensor	TC type K, Chromel-Alumel
	Resolution	0,2 ^{o}C
	Inaccuracy	±0,4 ^{o}C
	Range	-5 - +800 ^{o}C

D. Temperature

Sensor	TC type T, Copper - Konstantan
Resolution	0,1 ^{o}C
Inaccuracy	±0,2 ^{o}C
Range	-5 - +150 ^{o}C

E. Pressure

Sensor	Wheatstone bridge 0 - 500 mV/v
Resolution	0,001 bar(a)
Inaccuracy	±0,01 bar(a) for 0 - 1 bar(a) ±1% of actual value for 1 - 5 bar(a)
Range	0 - 5 bar(a)

F. Pressure

Sensor	Wheatstone bridge 0 - 300 mV/v
Resolution	0,001 bar(a)
Inaccuracy	±0,001 bar(a)
Range	0 - 1,5 bar(a)

G. General purpose

Sensor	0 - 20 mA, 4 - 20 mA[*1], 0 - 5 V, 0 - 10 V
Inaccuracy	0,1% of span
Range	As above

H. Scale

Sensor	0 - 20 mA, 4 - 20 mA[*1], 0 - 5 V, 0 - 10 V
Inaccuracy	0,1% of span
Range	0 - 500 kg

	I. Concentration	
	Sensor	0 - 20 mA, 4 - 20 mA[*1],
		0 - 5 V, 0 - 10 V
	Inaccuracy	0,1% of span
	Range	0 - 1200 mg/l
Analog outputs		0 - 20 mA, 4 - 20 mA, 0 - 5 V, 0 - 10 V
		Resolution 0,4%
		Activation rate 4 Hz
Number of analog output modules		Maximum 4
Number of analog outputs with each module		2

*1. All four inputs on the module will be set for 4 - 20 mA when this alternative is used.

ZSE044 . . . . . Supervisor general

PACS Supervisor

The PACS SUPERVISOR is an independent system for supervision and documentation of sterilization processes. It monitors the process parameters using its own sensors and other instrumentation equipment etc., completely independently from those of the control unit.
Its physical construction is similar to that used for the PACS 2000 control unit, which means that any of the function and service descriptions in the operator's manual are applicable to both. However, certain menus are unique to the Supervisor: one such menu is that for emergency printout.
The control unit also supplies the Supervisor with information on batches, control unit sensor signals, phase designations, activated alarms and operator's codes that have been entered.

Calibration

It is just as important to maintain the accuracy of the Supervisor's sensors as it is to maintain the accuracy of the control unit's sensors. Calibration of both sets of sensors should therefore be carried out together.

Documentation

SUPERVISOR incorporates an advanced function for documentation of sterilization processes by recording a large number of process parameters, partly from its own independent monitoring devices and partly from the control system. These records, known as log files, can be stored on diskette or hard disk in an FPC, OPC or OPH for subsequent printout if required, or be printed out at the time on a printer.

The parameters that are normally recorded are pre-defined in the Supervisor when it is delivered from the factory. Up to 12 values on a line can be programmed using normal printout size: compressing the printout size allows up to 20 values to be printed on a line.

The selection and number of measured values can be changed using an OP 3, FPC, OPC or OPH unit. To make these changes requires access to the programming feature, which is password-protected, and can be performed as follows:

Operator's panel OP 3/FPC/OPC/OPH

Note: Only persons trained in programming the PACS 2000 may perform changes via the above operator's panels. Incorrect programming in the menus concerned could result in changes to the basic program with a risk of injury to operators or other persons.

- Select the 'System programming' menu.

- Select the 'System definition' menu.
- Select the 'Printer log signal definition' menu.
- Make the required changes.
- Confirm and exit the menu via F10.

Printout alternatives

Printout is available in the form of a list, containing all simultaneously measured values printed on a single line, referred to as logging, and/or in the form of a graph. A printout mode, which can be programmed by the OP 2 in Supervisor menu 4100, allows selection of the required printout modes.

Mode 1 printout
This printout mode provides an introduction, in the form of batch information, followed by logging of process parameter values.

Mode 2 printout
This printout is the same as for Mode 1, complemented by one or more process graphs. The types of graphs can be defined via the 'Definition graphic process display' Supervisor menu, available on the OP 3, FPC, OPC or OPH.

If data is to be stored on a diskette or hard disk, storage of the graph(s) should be programmed out.

If the graph(s) is/are to be stored, bear in mind that this will delay the logging time by at least 30 minutes. If a new process is started during this time, the storage process will be interrupted and the residual measured values will be lost.

Programming the system to remove the graph(s) when storing data must be performed only by personnel from Getinge.

Note that, even after programming the graph(s) to remove it/the from disk storage, the graph(s) will remain on printouts produced during the progress of a process.

Mode 3 printout
In this printout mode, an introduction in the form of batch information is followed by process details in the form of a graph. The graph is produced in real time, while the process is running, and is concluded at the same time as the process.

The graph is followed by printout of any activated alarms, together with all measured values at the time of the alarm.

Mode 3 printouts cannot be stored on diskette or the hard disk.

Mode 4 printout
This printout modes produces details of the process in the form of one or more graphs, which are plotted in parallel with the logged measured values. When operating in this mode, the logging intervals should be at least 30 seconds in order to allow the graph(s) to be plotted between the log points.

Mode 4 printouts cannot be stored on diskette or the hard disk.

Emergency printout
In the event of a missing printout, or of a printout that is incorrect in some way, an emergency printout of the most recently performed process can be produced.

Using OP2 in the Supervisor's 4500 menu, the emergency printout can be ordered by changing the zero to another figure. This cannot be done while the process is running.

The emergency printout can handle 600 logged values. If he process contains a greater number than this, the emergency printout will automatically omit every second reading.

ZSE045 . . . . . Addition for Supervisor 2 and 3

Safety functions

With its independent temperature and pressure sensors, the Supervisor also operates in parallel with the PACS 2000 control unit to provide duplicated safety for important monitoring functions. This means that the Supervisor, too, must approve a process step or parameter etc before a liquid cooling phase can be concluded after a process, or before the door can be opened.

Detailed information on its supervisory functions can be found, for example, under the 'Independent process supervision' heading in the MAINTENANCE chapter.

ZSE046 . . . . . Addition to Supervisor 3

Process supervision

The Supervisor uses this method also to monitor the process temperature and time conditions during the sterilization phase, ensuring that they comply with the criteria set out in sterilizer standard EN285.

If the permissible criteria are not fulfilled, the Supervisor stops the sterilizer and generates an alarm, even though the PACS 2000 control unit may have regarded the situation as approved.

ZSE047 . . . . . . Supervisor A4 printer without a key switch for the control system

Printer connection

An A4 printer is connected to the Supervisor for printout primarily of process logs and/or graphs, although it can also print out information such as calibration records.

If the PACS 2000 control unit does not have a corresponding printing facility, the A4 printer can be temporarily connected to its printer port. The PACS 2000 control unit in an FPC, OPC or OPH is then temporarily reconfigured for the A4 printer, after which the calibration record or other program information can be printed out.

ZSE048 . . . . . . Supervisor A4 printer with a key switch for the control system

Printer connection

An A4 printer is connected to the Supervisor for printout primarily of process logs and/or graphs, although it can also print out information such as calibration records.

A key switch allows the printer temporarily to be connected to the PACS 2000 control unit in order to print out its calibration records or other program information.

ZSE049 . . . . . . Common OP2 with the control system

Operator's control panel

The Supervisor shares the operator's control panel with the PACS 2000 control unit. The operator's control panel must normally be connected to the control unit, and be connected to the Supervisor only when its service menus need to be accessed for programming, calibration, emergency printout, production of calibration records or some other action. The menu structure and position is shown in the menu tree at the end of this chapter.

The operator's control panel must be changed over from one unit to the other only when the sterilizer is in the stand-by mode and de-energised, i.e. with the control current power supply turned off.

If an attempt is made to switch the panel from one to the other with the power turned on, or with the sterilizer in operation, communication to it will be locked, rendering control of, or information from, either of the units impossible.

Always exit from the service menus on the Supervisor or control unit before turning the sterilizer off and changing over connection of the operator's control panel. If this is not done, there is a risk of communication locking up.

ZSE050 . . . . . Separate OP 2 panel

Operator's control panel

The Supervisor is provided with a simplified operator's control panel containing display, ENTER ↵ rrow keys. During operation, the information displayed by the panel includes the Supervisor's own sensor measured values.
This panel is also used when the Supervisor service menu is to be accessed for programming, calibration, emergency printout, printout of calibration records or for some other purpose.

The menu structure and position is shown in the menu tree at the end of this chapter.

ZSE051 . . . . . FPC with OPH program and independent OPH

Operator's control panel

In the same way as for the PACS 2000 control unit, the Supervisor can be accessed from an FPC or OPH connected to it. The programmed sterilizer number, usually between 1 and 50, is used in order to address the PACS 2000 control unit.

The Supervisor is addressed using a separate address, completely different from the sterilizer number, after which its menus can be displayed on the screen.

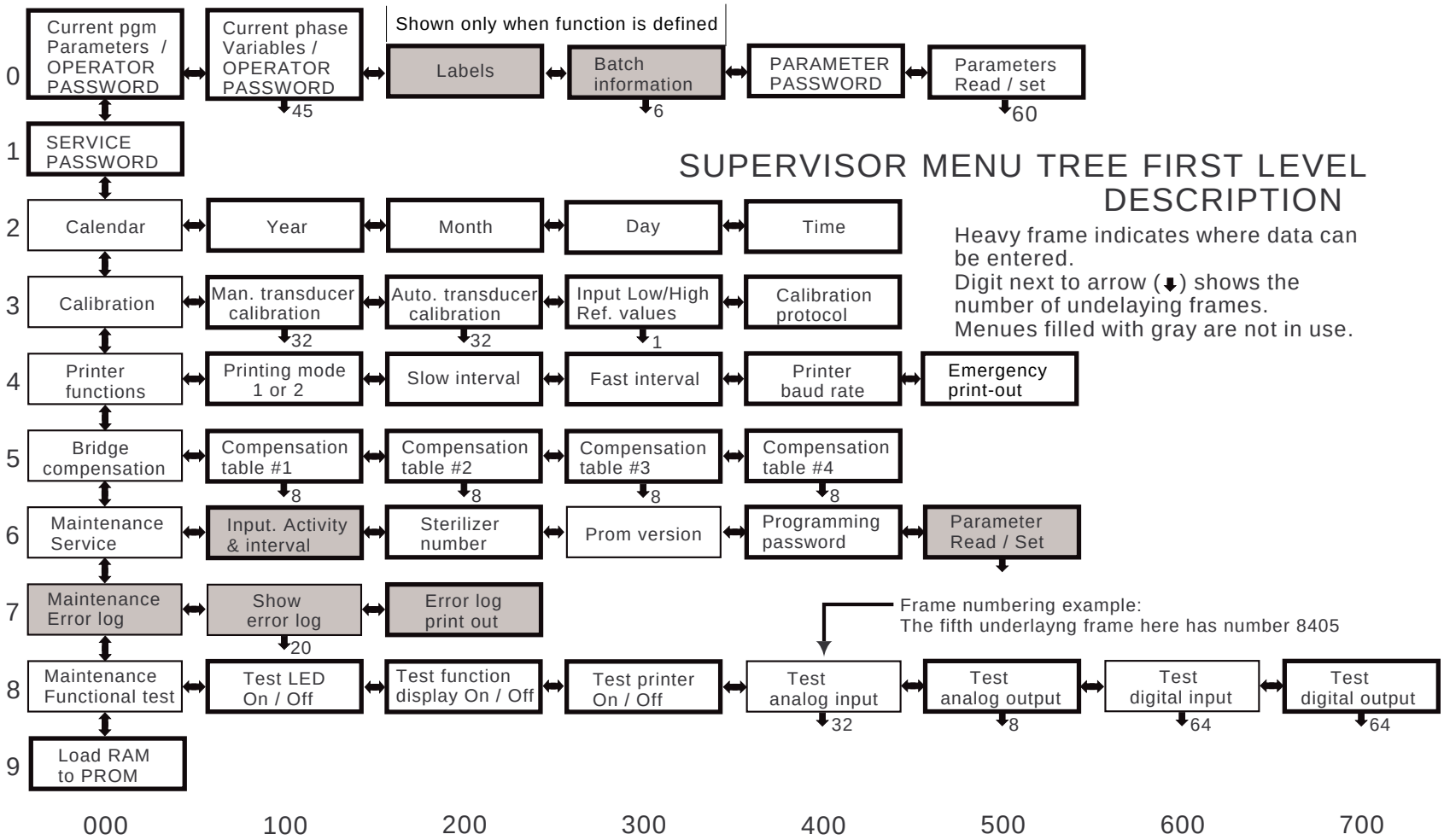
Address 51 is normally pre-programmed when the equipment is supplied from the factory. If more Supervisors are connected to the same network, it is recommended that they are numbered from 51 to 99 inclusive.

Programming

The method of all Supervisor programming is the same as for the corresponding menus in the PACS 2000 control unit. This means that, for example, the Supervisor's number is programmed in the same way as the sterilizer number.

Technical data

The SUPERVISOR is constructed from the same hardware as the PACS 2000 control unit, which means that its technical data is the same.


Shown only when function is defined
0
Current pgm Parameters / OPERATOR PASSWORD
Current phase Variables / OPERATOR PASSWORD
45
Labels
Batch information
6
PARAMETER PASSWORD
Parameters Read / set
60
1
SERVICE PASSWORD
SUPERVISOR MENU TREE FIRST LEVEL DESCRIPTION
Heavy frame indicates where data can be entered.
Digit next to arrow (⬇) shows the number of undelaying frames.
Menues filled with gray are not in use.
2
Calendar
Year
Month
Day
Time
3
Calibration
Man. transducer calibration
32
Auto. transducer calibration
32
Input Low/High Ref. values
1
Calibration protocol
4
Printer functions
Printing mode 1 or 2
Slow interval
Fast interval
Printer baud rate
Emergency print-out
5
Bridge compensation
Compensation table #1
8
Compensation table #2
8
Compensation table #3
8
Compensation table #4
8
6
Maintenance Service
Input. Activity & interval
Sterilizer number
Prom version
Programming password
Parameter Read / Set
7
Maintenance Error log
Show error log
20
Error log print out
Frame numbering example:
The fifth underlayng frame here has number 8405
8
Maintenance Functional test
Test LED On / Off
Test function display On / Off
Test printer On / Off
Test analog input
32
Test analog output
8
Test digital input
64
Test digital output
64
9
Load RAM to PROM
000
100
200
300
400
500
600
700